Volume XXI Number 9

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DISEASES OF THE NERVOUS SYSTEM

A Practical Journal on Psychiatry and Neurology

SEPTEMBER

1960

(CONTENTS ON PAGE 480)

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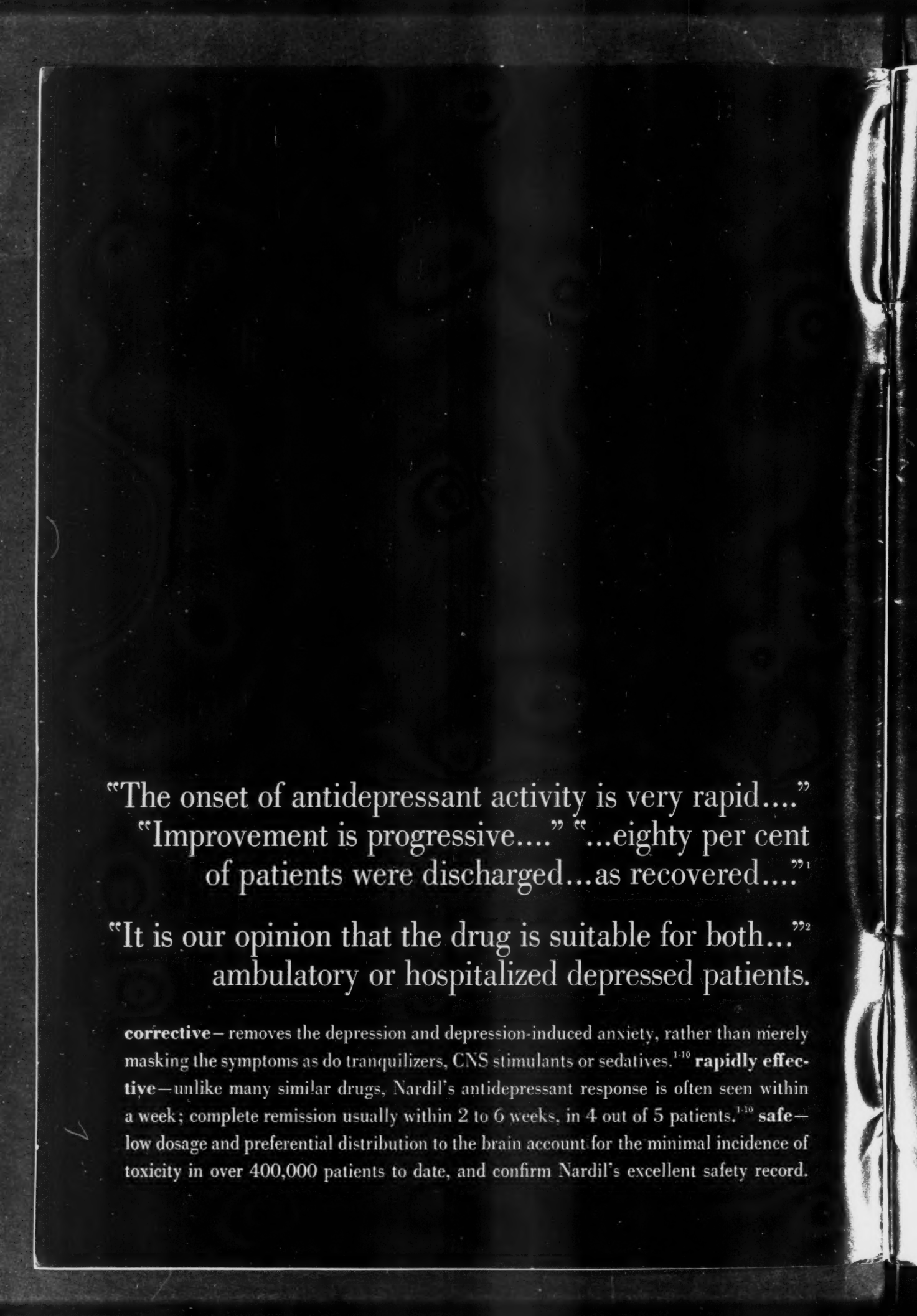

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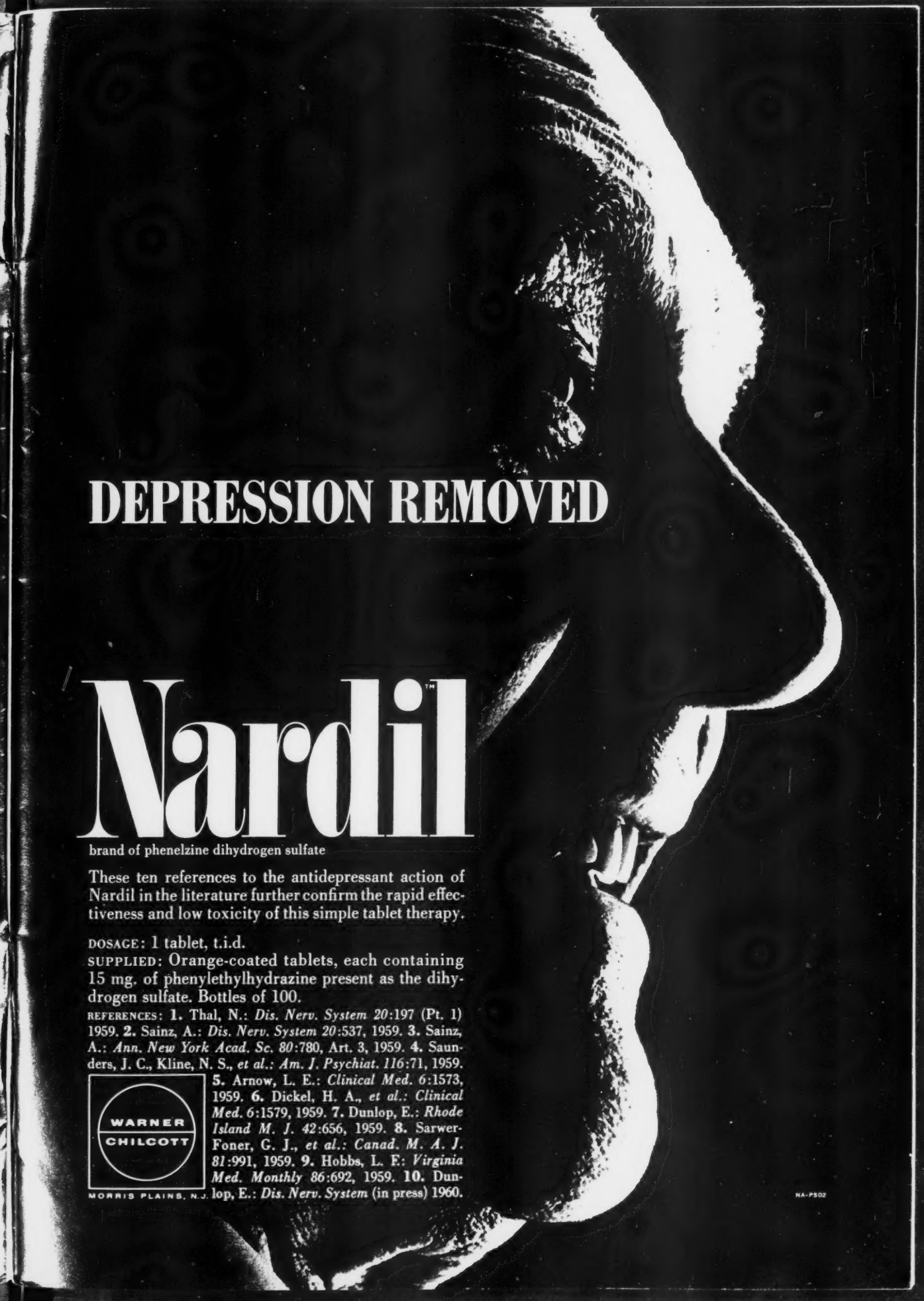

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Volume XXI SEPTEMBER 1960 Number 9

DISEASES *of the* Nervous System

Contents

A STUDY OF EPILEPTICS RECEIVING GROUP PSYCHOTHERAPY 491
Charles L. Yeager, Donald A. Shaskan and Francis J. Rigney

CREATIVITY, CONSCIOUSNESS AND REVELATION 499
Nathaniel S. Lehrman

INHALANT AND INTRAVENOUS INDOKLON IN PSYCHIATRIC TREATMENT 505
David J. Impastato, Charles Buckman, Pompeo Milici, Irving Pinsley, Arthur Krell, Arthur Impastato and Louis Padula

ELECTROENCEPHALOGRAPHY AND THE SEDATION THRESHOLD 508
Ali A. Kawi

COMBINATION OF ANTIDEPRESSANT WITH ELECTROSHOCK THERAPY 513
Edwin Dunlop

PROMAZINE HYDROCHLORIDE AND COMBINED PROMAZINE HYDROCHLORIDE-MEPROBAMATE TREATMENT OF HOSPITALIZED PSYCHOTIC PATIENTS 515
George Vlavianos and Ludwig Fink

USE OF TRIFLUOPERAZINE IN CHRONIC PSYCHOSES 518
Lewis R. Roddy

AGE REGRESSION BY HYPNOSIS 520
Cornelia B. Wilbur

CLINICAL TRIAL OF RO 5-0690 AND CHLORPROMAZINE ON DISTURBED CHRONIC SCHIZOPHRENIC PATIENTS 527
T. E. Weckowicz and T. Ward

PSYCHIATRIC AND PSYCHOLOGICAL ASPECTS OF MYXEDEMA 529
Carl P. Malmquist and James C. Kincannon

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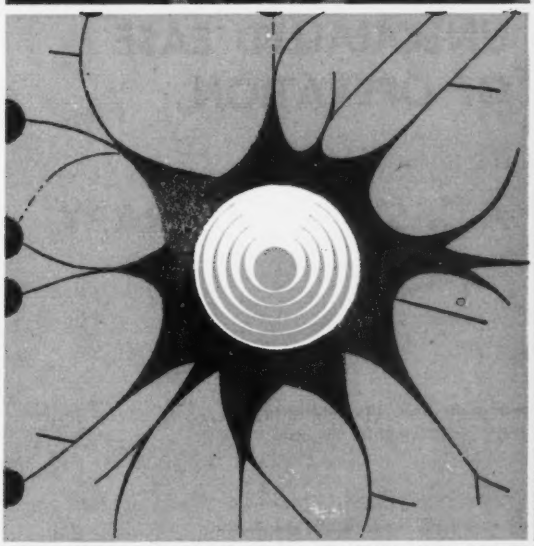

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DISEASES *of the* Nervous System

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

A Study of Epileptics Receiving Group Psychotherapy

CHARLES L. YEAGER, M.D., DONALD A. SHASKAN, M.D.,
and FRANCIS J. RIGNEY, M.D.

Introduction

Epilepsy is a recurrent episodic crisis in which the victim is suddenly bereft of his senses. The afflicted one often is a spectacle to those who behold him.[9] His expectation is that of emotional and social devastation. The epileptic suffers the anxieties and fears which may accompany any serious illness, but the sympathy and encouragement of his community may frequently be replaced by misunderstanding and rejection.

In his studies on epilepsy, Hughlings Jackson[6] learned that emotional disturbances can lead to epileptic seizures. He felt that it is not the psychological content, but rather some change in bodily function associated with strong emotional reactions that precipitates mass discharges of unstable nerve cells.

The emotional reactions aroused by epilepsy do not involve only the person seized; they are also communicated to his family and friends, and even to chance acquaintances. The epileptic lives constantly with the sense of shame, depression, bitterness, resentment, and even secrecy and deception. Consequence becomes cause. Aroused anxiety induced by the reactive mistreatment by society can precipitate a seizure and so continues the "vicious circle." Many of these emotional reactions are experienced on a conscious level and may be treated if approached with understanding. Without doubt many reactions are rooted in the unconscious.

Epilepsy is the expression of a periodic physiological dysfunction which has its basis in multiple causations, including hereditary determination,[8] metabolic defects, and the casual factors of disease and injury.[1,7] Emotions act to accentuate, not to initiate, epilepsy. An emotional crisis can, and does, "trigger" an epileptic seizure.[5] Abnormal brain waves may appear during the recall of emotionally charged experiences. They are thought to be associated with behavioral reactions, centered in the conflict between efforts to recall traumatic experiences, and distress arising from such recall.[2]

Among others, one function of the seizure is the maintenance of physiological homeostasis.[1] That is to say, the convulsion acts to alleviate the intolerable tensions built up by emotional conflict. It acts to relieve rage and frustration. It is a palliative which aids the organism in its struggle for self-preservation but, at the same time, leads the victim to the brink of oblivion.

From these observed correlations in the physiological, psychological, and sociological functions of the epileptic, arose the desire to attempt amelioration of his symptoms by psychotherapeutic methods. A number of physicians have worked with the epileptic through individual psychotherapy interviews with reasonable success.[4,5]

Based upon the belief that many of the problems harassing the epileptic are represented by defects in his interpersonal relationships, group therapy has been utilized, as an independent function, and as an adjunct to individual psychotherapy.[3,12]

These considerations motivated the therapeutic experiment herein described.

Group Structure

The group was organized at the Mental Hygiene Clinic, Regional Office of the Vet-

From the University of California School of Medicine and The Langley Porter Neuropsychiatric Institute, State of California, Department of Mental Hygiene, San Francisco 22, Cal., and Mental Hygiene Clinic, Regional Office, Veterans Administration, San Francisco, California.

erans Administration, San Francisco, California. It was held two hours weekly, on Monday evenings, and on Wednesday afternoons. There were two therapists—a male psychiatrist (Charles L. Yeager, M.D.) as leader, and a female psychiatrist (Lillian Cottrell, M.D.) as co-leader.

The members were all male veterans ranging in age from 20 to 55 years, whose epilepsy was adjudged service connected. The time from the onset of the first seizure ranged from 6 to 30 years. No selection was made on the basis of the type or frequency of attacks, only that there be a common presenting symptom, convulsions.

At the outset, as long as seizures were the dominant clinical manifestation, no restrictions were placed upon coexisting disorders, such as hysterical phenomena, psychopathy with acting out features, alcoholism, schizophrenia, and seizures related to hypoglycemia. Later, the elimination of such ancillary behavior factors at the time of intake was found to be expedient. Once admitted to the group, patients were not discharged by the therapists.

One patient was considered to have hystero-epilepsy. A definite diagnosis, however, had never been established. Being aware of the diagnostic confusion, he compared himself with the others. Doubts which arose in his mind led eventually to voluntary withdrawal from the group. Similarly, a patient with seizures accompanying hypoglycemic reactions fancied himself as non-epileptic. "My condition is not like these others; I don't belong here." He, also, voluntarily withdrew.

The alcoholic, in a casual way, was glib, an easy talker, persuasive and charming. Yet, he repeatedly displayed his insecurity, often resorting to alcohol, and coming to the therapy hour drunk, in order, as he put it, to "lessen the feeling of embarrassment." In his drunken state he would unleash his hostilities mercilesly, selecting one at a time for his attacks. The group responded with a silence, which would often force the patient to leave the room. However, on a number of occasions he would wait outside the building until the meeting was over and try to involve the other members in his hostile schemes. When his conduct was openly discussed in the group the alcoholic epileptic left and did not return.

The acting out psychopath remained with the group for several months. He talked incessantly, to the point that the integration of the group was threatened. He was rough and mean; both patients and leaders were irritated by his conduct. One day a patient (D) said, as though speaking to a third person, but looking towards the ceiling, "I get tired of hearing that other member (meaning M) talk so much." Nothing more happened; conversation continued in a trivial vein.

Five weeks, nearly ten sessions, later, without preamble (M) looked at (D) and said, "You don't like the way I talk. I'm getting sick of you, too. If you want to fight, come out on the street—or maybe you want to fight right here." After a short period of delay, the group began to react. Tension became intense. The leader said, "Almost any activity is permitted here except physical violence." The group began to laugh noisily and made facetious small talk. (M) was unable to resolve the problem and left the group permanently. He, however, continued with individual therapy for many more months.

The one overt psychotic, who was deaf, remained completely silent for many hours. He showed signs of agitation, such as tapping his foot and staring from member to member. After several weeks, a member asked, "Why doesn't (C) talk?" The leader (Y) replied that he was hard of hearing and read lips. (C) spoke up and said, "What's there to talk about? I've been down-graded from brakeman to no job. I would just as soon kill all of you, and that includes you!", directing his gaze at both leaders. This was his last session. No more information is available.

Subsequent to this episode, patients evidencing disturbing behavior, not attributable to seizures, or the problems pertaining thereto were screened from the group. Other, less severe reasons arose to interfere with patients' continuing with the group. One

dropped out because he became emotional and cried. Others, in a similar circumstance, had no such reaction. Several quit the group because they could not bear to hear the others describe their attacks.

From the onset, July 13, 1949, to its termination, October 2, 1951 the group varied in size from three to eight averaging about five members.

Motive and Goal

It was the opinion of those involved in planning the group that epileptics were suffering as much from isolation as from any other element of the disorder. It was furtheir believed that much of the psychological disturbance was deeply ingrained, and that the greater share of their conflict was below the level of awareness. Group function was not to be deeply analytic, but, instead, associative, interpretative, and supportive, permitting, if possible, identification of the members with each other and with the leaders.

The goal was to study the effectiveness of group identification, and its influence on the patient's ability to deal with his disease, his loss of status in the family and community, and his work problems. Lastly, there was a keen interest in the effects that psychotherapy might have upon the sequence and severity of seizures.

The therapeutic attitude was that of permissiveness; control was maintained, but used with discretion. To prevent defenses being built up in this parameter, the doctors involved with the group were freed from the administration of medication. The leaders discussed their reactions and observations with one another after each session. Speculation was permitted but no theories were formulated.

Course

Therapeutic Processes:

For the first few weeks there were only two patients in the group, (D) and (M). (D) was the only member who began in the first hour and remained throughout the 28 months of therapy. As stated, after several months, following a violent outburst in which he threatened (D), (M) quit the group.

Hourly notes were made, some sparse, some complete. Often notes were summarized in terms of time periods. Changes in group dynamics were summarized.

In the course of working-through, six phases of activity seemed apparent. The initial phase absorbed roughly the first nine months. It could be referred to as the *talking-exploring* phase, in which, with the constant introduction of new members, little solidification of discourse could be detected. In essence, months were spent on talking about seizures: "Why do you have seizures?", "What are yours like?", "What kind of medication . . .", "How often mine are . . .", and so on and on. In after-hour discussions the leaders almost despaired that any movement was afoot. The prolonged superficial conversations were matched by equally long silent periods in which anxiety and hostility were displayed silently. Some would put newspapers before their faces and ignore the others completely. Some would tap their feet. Occasionally one would make a "wise crack," thereby freeing conversation once again—only for it to return to the subject of fits.

The second, or *dependency,* phase was relatively short, only two or three months. It really never disappeared completely. Discussion between members reduced markedly and questions were put to the leaders. "I have an incurable disease. What good is all this, anyhow? What are you going to do about it?" "You take all from us; you don't give anything back." "You don't have epilepsy, so how can you pretend to understand us?" "You're a doctor. You should know what is going on." Hate for doctors, police, and bosses was intense.

The third, or *arrival,* phase seemed to mark the end of the earlier testing periods and introduced the element of ego strengthening. Subtly the members turned to themselves for answers. They continued to show a need for protection by the leaders and evinced less fear of criticism and less suspicion of one another. There was a growing

manifestation of insight into the character of their conflicts and the impact of such conflicts upon themselves and others. They talked of control of oneself. "Can my attack be prevented if I learn not to get mad?" "The doctors are here to help us."

The fourth, or *revolt,* phase manifested a rising boldness. The leaders had lost their awesomeness. They were no longer looked upon as powerful objects to be feared. "It is the doctors giving us medicine who help us, not the talking doctors—who don't talk, anyway when you want them to." "They are like your parents; you are afraid of them, but when you grow up most of them are weak." "Especially women—they are always sick."

In this phase speech became freer and less rapid, and more deliberate. Reference to seizures was minimum. Long silent periods continued to mark most sessions. Hostility continued to be poured out but lacked the vehemence evidenced in the earlier months. At the arrival of this phase, the group had stabilized at six or eight members. New members had not come in for some time.

The fifth, or *solidification,* phase was characterized by a commonness of aims. The members of the group began to show warmth towards each other. They talked of their own private interests, described and laughed a bit about their difficulties in obtaining work. They could even speak of the police without anger.

The sixth, or *terminal,* phase brought out desires, ambitions, and plans. Some of the members had gotten jobs. The members became restive and expressed the desire to dissolve the group. Their need to "go out" and "do things" became increasingly evident to the leaders.

The exact end of the group as a spontaneous dissolution is not known. Administrative reasons terminated the study, rather than the natural closing-out process. The majority of the patients in the group were also receiving individual psychotherapeutic interviews on a weekly basis. In most instances individual therapeutic sessions were continued.

Individual Reactions and Inter-Reactions

It is obvious that the volumes of spoken words cannot be reproduced here, nor would such a tabulation offer much to the thesis. The stages in the therapeutic progress conform in a way to the stair-step process of learning. When insight arrived it was often universal, and was shared in some measure by all in the group including the leaders. On repeated occasions it was noticed by the leaders that in the hour when they felt themselves near a break-through in interpretation, the patients would express in their language some discovery into the dynamics of their own actions. Such mutual happenings became more frequent, after the stage in which strong defenses were manifested had passed.

(D) and (M) were alone with the leaders for the first three or four hours. (M), a large, rugged, poorly educated laborer dominated the period by talking almost continuously. (D), a frail, quiet, pleasant person, was seldom allowed to speak, even at the request of the leaders. Whatever he would attempt to say (M) would retort, "That's the same as my situation." About the only comment (D) could make, usually at the close of the hour, was, "I have strange symptoms in my stomach."

Shortly after a third patient (Di) joined the group, (D) seemed less strained and less sullen. For the next six to eight weeks the causes of convulsions were discussed. The pent up anger (much of it on a conscious level) revealed in the discussion of epileptic attacks is well emphasized in the following illustrations.

(M) quarreled with his mother-in-law about who was to put the child to bed. He flew into a rage, broke up furniture, and knocked a hole in the wall with his fist, breaking a knuckle. His wife said, "Walk and you will feel better." He did. He told the group, "When I can't stand it, I have a fit." Many of his fits begin as temper tantrums.

(D), after having a seizure, was told by his wife, "You've done a fine job. Now, clean up the mess." "I felt extreme anger, and

wanted to strangle my mother-in-law." It should be noted that his violent thoughts were directed away from his wife, who was the antagonist.

(D) further commented that he seldom had seizures at home or at work (as a cabinet maker). However, almost every day when he played cards with his fellow workers after lunch he had a seizure. They covered up for him and the boss did not know that he had epilepsy. The very setting in which he was most protected seemed to activate attacks. As the group continued, more members were added.

With few exceptions, each patient described drowsiness, and even heavy sleep, coming on as a reaction to severe frustration and anger. To sleep meant to avoid a seizure. If sleep failed, or by necessity had to be dispelled, a seizure would often ensue. In all but one case, sleep was a euphemism for the convulsion. (Su) had nocturnal seizures, but they seldom occurred in the waking state. He described nightly dreams, mostly of running away from something; he never knew what. He would frequently awaken from an attack feeling weak, and "everything seems strange and unrecognizable." "I had my first attack when I was in the army hospital writing to my mother. I think she is shell-shocked—she is so religious. She talks to the moon. I should live away from her. When I talk about these things I dream and have attacks at night."

While the group as a whole continued in this vein of talk about their family and friends, their seizures, medication, adjudication procedures of the V.A., etc., (D) and (M), the first two in the group, continued their hostile activities towards each other. Tension mounted, and (D) accused (M) of talking too much. The events related earlier ensued, and, in the wake of his own violent threats, (M) voluntarily left the group.

It is felt by the leaders that this event marked the beginning of Phase Two, which became apparent considerably later. The breaking of the focus on pseudo-medicine, seizures, and family as the sole occupation of their thoughts, was followed by their attention becoming directed towards the leaders.

On an evening as the group assembled, one member, (Sa), bounced in, sat down, and opened the conversation by demanding, "What'll we talk about tonight, Doc?" No response. He described a dream. "Now, Doc, what does that mean?"

The co-leader replied, "Do you want to talk about it?"

(D) interrupts, "Sometimes I feel like I have two minds. I want to do something and I don't. I have 'locked' words; can't say what I want."

(Sa): "I think all epileptics are crazy. Am I crazy, Dr. Y?"

Dr. Y: "Tell us more about this feeling. Perhaps the group has some ideas."

(Sa): "You see? He doesn't answer me; he thinks we are crazy. All epileptics are crazy."

From this beginning, for a fairly long series of meetings, the group talked of their mistrust of doctors, none of whom give the same medicine. They talked of mail order medicine, and brought newspaper clippings and advertisements on cures for "the falling sickness." All of this was attended by the one basic question, "What do you think of this? Can it cure you?? You should do something to help us. I only came because I thought I could be helped."

A long discourse ensued on the role of the V.A. in their care. Whenever V.A. policy arose, each was referred to the adjudication service for advisement. The recommendation was usually met with silent resignation—with the implied meaning, "That's about what I expected."

In this period a strange occurrence took place. (R), the oldest member of the group (age 55), had had seizures for 30 years. His attacks came regularly on Mondays and Saturdays. His attendance was irregular. Each time he failed to appear, which was most often on Mondays, he reported that he had had a seizure. Without forethought, the leader asked, "If you like the group and don't want to miss, why don't you have your attacks on Thursday? In that way they won't interfere with either hour." From

that time on, he had almost all of his attacks on Thursdays, and continued to attend regularly until the group was disbanded.

During this entire period, expressions of strong hostility towards the V.A., doctors in general, work bosses, and the police, who would find them in a seizure, consider them as drunks, and throw them in the "tank" without their medication, were continued. Many descriptions of beatings about the face and head were recorded. One member described an incident of being picked up out of a seizure by a "cop," who directed two men in civilian clothes to take him to his room. They rolled him for his money and clothes.

The leaders recognized the basic truths in the descriptions, but also sensed the emotional over-reaction building up as members found sympathetic listeners among themselves. The discovery of identification among themselves as they berated their enemies, real and imaginary, marked the beginning of the middle phase. The pouring out of hostile material continued, but became less vitriolic. Silent periods became shorter. Tolerance for the doctors became apparent.

The onset of the fourth phase was not too distinct. In a sense it was a continuation of Phase Three, except for the evident revolt against all authority, especially doctors. Little can be added beyond the description in the paragraph outlining Phase Four, except for one incident which capitalized the "boldness" which was arising in their new freedom of speech and action, and the sudden shock experienced when, in this new freedom, they overextended the limits of their own rigidly set emotional boundaries.

Somewhere near the beginning of Phase Four, which exemplified group power and agrandizement, the co-leader, a lady doctor, was replaced by a psychiatric resident. The group reacted to this, at first by reverting to some of their earlier methods of isolation and silent resentment. Soon, however, this was dealt with, and the group activity progressed much as it had been.

The resident was vigorous, and himself somewhat aggressive, asking probing questions and inviting personal comments. Prior to one of the sessions, he approached the leader, and requested that he invite the members to state how they felt towards him. The leader consented to the procedure. About half-way through the session, following several silent moments occurring after direct questions, the co-leader asked the group, "What do you think of me?"

(D), the first member to join the group, and the one who had shown the most change, replied, "Do you really want us to tell you what we think of you?" The co-leader said, "Yes, tell me."

The next fifteen minutes brought on a tirade of profane vindictiveness and personal insults such as leader and co-leader had never heard before. The tirade ended abruptly. Heavy, embarrassing silence settled on the group. Eyes were fixed and the leader observed that he alone was looking about the room—but speechless. The hour came to a close and the leader dismissed the group by saying, "We will see you next Monday." On Monday none of the members (at that time eight) showed. With the anxiety of the remembered tension and embarrassment, the leader was convinced that the group had suddenly been dissolved. On Wednesday all eight members reappeared, each with the same story. Within four hours of the time of the meeting on Monday, each had had a grand mal convulsion, and could not come. Three had attacks en route to the clinic; the remainder had their attacks at home.

The concept that seizures re-establish physiologic equilibrium disturbed by emotional charges, and that the unconscious can utilize the seizure to the benefit of the organism, seems to be well illustrated in this incident.

This convulsive incident marked the beginning of the fifth phase—the phase of *solidification.* (Corresponding to the *cohesion,* or middle, phase of Shaskan.) The group became warm. They began a camaraderie which was revealed by their free exchange of ideas and plans. They talked of work and of hunting for jobs. They were able to speak of the police, doctors, bosses, siblings, and parents as though they recognized that they were persons like themselves.

Hostilities, resentments, anger, fears, the

whole gamut of emotions, continued to be felt, but they could be talked about. It was believed by the leaders that the members of the group had gained self-esteem, ego strength, and insight into their disease. They began to sense their strengths and limitations and sought to adjust to them.

The sixth, or *terminal,* phase was characterized mostly by plans for quitting the group and trying to work out future hopes. Those working had less fear of losing their jobs. Others were out looking for work. Group therapy in this special setting was coming to a close. This was fortunate, because outside matters made it necessary to terminate the group a few months sooner than would have been expected in the usual course of therapy.

Follow-up

Of the eight who finished in the group, three continue to come to the clinic for medication. Two of these are working, one is not. He lives at home with his family. He has been unable to return to his work as upholsterer.

Two transferred to a facility at Oakland which is more convenient to their location. One is continuing in his occupation as a cabinet maker. The other is not working. He was a refrigeration engineer on a ship and has been slowly down-graded in occupation. His wife works. He does odd jobs.

The seventh is seriously ill with cardiovascular disease and is hospitalized.

The eighth died two years after completion of group activity by suffocation from a convulsion in bed. His death was preceded by a strange event. He had always been highly envious of his brother who is a successful chemist. He talked of his desire to do something important himself. The night before his death he won a first prize in a bowling match. He became very gay and elated. As one friend said, "almost as though he were hopped up." Although usually not a drinker, he drank several beers with his team-mates to celebrate his winning. He went home and to bed. At 5:00 A.M., his mother was awakened by a noise and went to his room. He was prone in bed, his face in a pillow. He had smothered during a seizure.

Discussion

Epilepsy is a physiologic disorder characterized in the electroencephalogram by a paroxysmal cerebral dysrhythmia, and clinically by a sudden loss of consciousness. A discussion of the question as to whether the causes of the disorder are organic or functional would be academic. From as early as the time of Hughlings Jackson it has been the observation of those who have studied the disease that emotional conflicts, *per se,* may activate seizures.

Aside from research interest in the cause and medical interest in control of seizures, psychiatric and sociological interests are uppermost. An individual struck down by a convulsion faces an overwhelming damage to his own worth, his interpersonal relationships with family and friends, his status in the community, and his chance for economic success.

The purpose of psychotherapy is to help a person regain these goals. Strengthening of the ego through individual psychotherapy seems to lessen the threat of seizures by lowering the emotional charges which can, and do, precipitate attacks. Because the epileptic suffers from severe disturbance of his relationships with others, it has been considered good practice to attempt group psychotherapy as a means of working through the conflicts at an interpersonal level.

Schiller[10] is of the opinion that much material arises in the group setting that does not come out in individual psychotherapeutic interview. In the work herein described individual and group types of therapy were mutually beneficial.

The principal rationale for setting up group psychotherapy for epileptics is to seek means of re-establishing inter-relationship with others, by gaining insight, and strengthening of severely weakened ego. Alleviation of seizures is of secondary importance. Increased ability to deal with problems attending the disease and adjustment to the handicaps thus wrought, have much more significance.

It is of some interest to note that in the entire period of psychotherapy (approximately 28 months), only one seizure was observed during a therapeutic session. It was a minor attack of a few seconds' duration. Seizures occurred before or after the therapeutic hour. This lends support to the concept that the active epileptic has fewer seizures.[9] The danger of precipitating attacks by mobilizing unresolved unconscious conflicts and drives, as observed in psychoanalytic therapy,[4] is not as evident in the group setting. It is felt that the interaction of the group members tends to dissipate the threatening force of emotional charges which otherwise could break through the lowered physiologic thresholds of the epileptic and trigger a seizure.

Summary

1. Group psychotherapy was initiated on selected cases of service connected male veterans with epilepsy.

2. The motive for the endeavor was to attempt psychosociological readjustment of individuals devastated by the ego crushing effects of convulsive seizures.

3. The selection of group activity was based on the assumption that weakened interpersonal relations could be strengthened by interpersonal experiences in an understanding and permissive setting.

4. Group psychotherapy was not considered a substitute for individual therapy, but, rather, as an adjunct which would allow individual working-through in a setting with contemporaries who were similarly affiliated, and with authority figures.

5. The group progressed through six stages of change, showing increase of insight, recognition of the proper position of authority, comradeship, identification, understanding of the disorder by which they were afflicted, recognition of limitations in society, establishment of self-esteem and strengthened ego, and a final desire to return to the community and take up their rightful positions again.

The therapeutic experiment showed a reasonable fulfillment of expectations. In some respects the project fell short, but there was sufficient gain to warrant continued study.

6. Epileptics can identify with others similarly afflicted. Certain disorders associated with epilepsy seemed to act as a hindrance, rather than an enhancement to group continuity, namely, hysteria, acting out psychopathy, and overt psychosis. Latent psychosis had no significant effect.

7. Group activity over the months supported the contention that reducing emotional conflicts lessens seizure manifestations.

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Creativity, Consciousness and Revelation

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The Immediate, Automatic Response and the Later, Conscious Response

Brain writes[2] that "Sharpless and Jasper[15] working with sounds . . . distinguished two types of arousal reactions: one of short latency and brief duration, and the other of longer latency and greater persistence, which they call the phasic and tonic reactions respectively. . . . They conclude that 'the tonic and persistent arousal response is probably mediated by the lower portions of the ascending reticular system, and the more rapid and more highly differentiated response by the upper portions of the activating system, particularly the unspecified thalamic projection system and adjacent sensory structures.' "

The initial emotional "meaning" of a stimulus, and the initial direction of response to it, are therefore apparently determined almost instantaneously by the interaction of previous reflex and memory engrams evoked by the stimulus within the cortex and upper portions of the brain stem, probably the thalamus. Because of the priority of painful stimuli,[16] the existence of painful cortico-thalamically mediated associations to the stimulus will tend to activate the lower centers, including the reticular formation, so that vigilance and responsivity are increased. Thus, the initial response to a stimulus is apparently determined by the highest centers, but in a way in which the painful aspects are probably usually over-represented.

This seems to be the simplest explanation of the fact pointed out by Brain[2] that "reticulo-cortical impulses, which are credited with initiating and maintaining the conscious state, arrive at the cortex after the impulse excited by the same stimulus which is held to be responsible for those perceptual elements which comprise the content of consciousness."

Whether, on the basis of past experience, a given stimulus is to be reacted to as pleasurable or painful is therefore determined both initially and ultimately, "phasically" and "tonically," by the cortex, whose "decision," based on the "pain" and "pleasure" system cells included in the respective engrams, is then transmitted downward along the neuraxis. This stimulates the lower pleasure and/or pain centers, both neurological and possibly endocrine. It seems likely therefore that when heightened consciousness or increased vigilance is produced, it is the result of stimulation of the lower pain centers, including the reticular formation, primarily from above.

Hence the cortex apparently determines response in two somewhat different ways. The first is rapidly to determine the over-all affective quality of a stimulus, and roughly, the over-all intensity of the response necessary. This "phasic' first type of response is usually accomplished non-verbally and very rapidly, and therefore "unconsciously." Because of the primacy of pain, this "phasic" first response tends to produce more alarm and potential withdrawal than its more "considered," "tonic" successor.

The second type of response, Sharpless and Jasper's "tonic" response, differentiates more finely the different aspects of the stimulus or situation as more or less pleasurable and/or painful in themselves; this is accomplished much more consciously, through the greater use of verbal symbols.

Recent work on the phenomenon of "subception" tends to corroborate the proposal made here of the nature of the temporal relationships between responsivity and consciousness. When words are presented tachistoscopically to experimental subjects, responses are elicited even though the words have been presented too rapidly for conscious recognition.

*This is the second and final installment of this paper. The first appeared in August, 1960 *Diseases of the Nervoys System.*

"With the measurement of skin resistance as an index," writes Mirsky,[17] "(Lazarus and McCleary[18]) found that subjects gave a reliable response of the autonomic nervous system to words which were presented too rapidly to be recognizable. This phenomenon is (also) called . . . preconscious perception or preconscious registration."

We can postulate that in this situation the tachistoscopic stimulus registers and produces engrammatic activity which rapidly affects the autonomic nervous system, but which is not sufficiently intense to involve the left temporo-parietal area governing "consciousness." Fisher's[19] work with dreams in response to tachistoscopically exposed pictures also indicates that engrams stimulated by these brief exposures can, with encouragement, continue to reverberate outside consciousness, inasmuch as they are demonstrable the next day in the subject's dreams during the intervening night.

The Quantity of Emotionality

We have pointed out above how, according to Sherrington,[3] "every cognition has, potentially at least, an emotive value." What does this mean in neurophysiological, engrammatic terms?

If, as Lilly[11] proposed, there are two separate but interdigitating systems, near the midline of the central nervous system, governing pain-withdrawal and pleasure-approach, all engrammatic circuits involving cells in the conceptual speech area must also involve cells in one or both of Lilly's basic systems. Indeed, we can go further, and propose that *all* reflex and memory engrammatic circuits, irrespective of whether they are conscious, involve cells in the pain or pleasure systems, or in both, which help determine the over-all direction of responses made when the particular engrams are evoked.

Those past experiences which we remember best, or which affect us most, are those with the most "meaning" to us. The meaningfulness of a past experience is determined by the intensity of its emotional connotations. This can perhaps be explained in neurophysiological terms, by postulating that the engram representing each experience includes cells in one or both midline systems, and that the amount of emotional charge attached to an experience, or to a concept, will be immediately determined by the number and location of the pain and/or pleasure system cells in the engram representing it. Since perhaps all ideas and experiences have an emotional quality to them, irrespective of whether or not they are conscious, we can now explain the concept of unconscious emotionality in neurophysiological terms.

Lilly's interdigitating pain and pleasure systems can also be seen as a further and more complete analysis of Penfield's "centrencephalic system," "that central system within the brain stem . . . responsible for integration of the function of the hemispheres,"[5] "the system of central organizing connections which makes available to conscious thinking the many different neuronal mechanisms within the brain" (p. 248), "which is forever busy with the organization of the present" (p. 233).

Penfield's formulation tells us that the over-all direction of response is somehow determined by midline structures, while Lilly's analysis shows the two basic directions in which these midline structures can point and propel, as the result of their integration of *all* the reflex and memory, cortical and subcortical, engrammatic responses to a particular stimulus.

The amount of emotion involved in any conscious or motor response can then be seen as also determined at first by the extent to which cells of the pleasure and/or pain systems are involved in the particular new engrammatic circuit. While this extent is probably first determined by the number of pleasure- or pain-system cells which are involved, beyond a certain point, significant neuro-hormonal effects may well also enter, through the mediation of the autonomic and endocrine systems.

This is probably the case in the presence of intense pain, or of intense fear, which is the painful anticipation of pain, or of intense anxiety, which is the painful anticipation of pain from an unknown source

against which one feels helpless. Excessive pain, fear or anxiety, can produce excessive inhibition within the central nervous system, so that the pain or fear becomes overgeneralized onto other stimuli which have been associated in any way with the painful stimuli, although previously not painful in themselves. This process, which can reverberate and feed on itself to the point of disaster, causes what Freud called repression. In repression, the painful quality of the consciousness of the experience is so great that it seems actively to inhibit the memory-engrams representing these painful experiences from passing through the conceptual center and becoming conscious.

In this writer's opinion, this excessive pain and fear seem to be the major source, if indeed not the only source, of functional mental illness. Hence, he has found it most useful and reassuring in his own psychotherapeutic work to quote President Franklin D. Roosevelt to his patients: "We have nothing to fear but fear itself." The statement is most useful even though it was made before nuclear weapons made existentialists of us all (almost).

Feelings as a Signal of Accuracy

But less massive stimulation of the pain system, which does not become over-generalized as just described to the point of panic, serves a most useful function to an organism as a signal that withdrawal is apparently necessary. In a human, uneasiness signals that there is some annoying or painful quality in a situation—or in a proposed response to a stimulus—even before the person is able consciously to define what this painful or annoying aspect might be. This fact is of tremendous importance in the formulation of new creative hypotheses, as well as in daily living.

Feelings of pleasure, analogously, indicate a situation—or a solution to a problem—which seems correct or comfortable. Hence feelings can be a signal in themselves of the possible "rightness" or "wrongness" of a proposed response, or of the total pleasure or pain in a particular situation.

A clear example of the value of feelings as an indicator of the value of a proposed response, and of their usefulness as a time-saver, is that seen in a chess player. From his total chess-playing experience, much of which is verbalizable should he care to take the time, he "feels" whether a proposed move is perhaps bad, or possibly good. His vaguely uncomfortable "feeling" that it is bad represents the sum total of a rather considerable amount of verbalizable material, whose conscious internal verbalization is thereby rendered unnecessary. This conscious use of feelings of discomfort and comfort as guides in the problem-solving of creative intellectual pursuits can considerably accelerate the creative process itself, provided that the individual's discomfort is not due to fear-inspired over-generalizations from his own past or present painful experiences.

Just as with the chess player, feelings can play a tremendous role in scientific and artistic activity. They can be a most useful tool in problem-solving, inasmuch as they are probably our best signal, based on our total past experience (remembered and unremembered) of whether an answer to a problem is pleasurable or painful, apparently right or apparently wrong. In situations requiring a creative synthesis, proposed solutions will have much that is experienced as correct, and therefore pleasurable, but if the thinker's feelings are keenly attuned, his sense of vague discomfort about a proposed solution will indicate to him that there seems to be some imperfection in it. Being aware of the existence of an imperfection, he will seek immediately to define and correct it, and thereby be saved from a long and fruitless excursion down an otherwise attractive intellectual blind alley.

The process of study, or of creative problem-solving, involves feeding the same stimuli—the aspects of the problem—into the brain again and again. As described above, this repeated activation increases the facility with which the engrams representing these ideas interact, thereby increasing their likelihood of integrating into new, previously uncharted, neurophysiological pathways.

But, as mentioned above, the sharpest dif-

ferentiation must be made between those hypotheses emerging into consciousness seeming comfortable and valid, and those which emerge with some discomfort clinging to them. Such discomforts will be experienced much more keenly by people who earnestly search for lawfulness and consistency, and find their absence "painful," than by people who are willing to accept contradictions without seeking to resolve them.

The keen differentiation required in this process takes a great deal of attention, and therefore requires considerable emotional involvement. This keen awareness is necessary for the maximal number of stimuli—including nuances of already known concepts—to be gathered consciously so that extra-conscious hypothesis creation can occur.

Since attention is based primarily on sensitization of the pain system, simultaneous stimulation of the pleasure system may also be necessary if the equilibrium of the individual is to be maintained so that panic does not occur. One way in which the pleasure system is stimulated is through the support and approval of family, colleagues and friends. Another source of pleasure system stimulation is a sense of value in one's work, which produces pleasure from the achievement of a role-goal.

Consequences of Creative Sensitivity

The sensitivity which is required of the creative scientist or artist has two most important results: the tremendous emotionality with which the creative process is filled, and the carryover of creative hypersensitivity into the creative person's everyday life.

Bronowski has pointed out how filled with emotionality the creative process is. "It engages the whole personality in science as in the arts," he writes. ". . . A gifted man cannot handle bacteria or equations without taking fire from what he does or having his emotions engaged."[1] President Nathan M. Pusey of Harvard underlines the pleasurable aspects of creativity: "Activity of intellect is marked by freshness, excitement, beauty and growing power. . . . When individuals give of themselves unself-consciously and unfeignedly, they find their lives suffused with a very exhilarating kind of joy.[20] Successful creativity is therefore one of the most potent stimuli to the pleasure system, as Archimedes demonstrated when he leaped from his bath shouting "Eureka" at the top of his voice.

When one's feelings are finely attuned to his work, as is inevitable in creative endeavors, he of necessity becomes more responsive than average; since the creative person is a single neurophysiologically-integrated human being, the sensitivity he cultivates in his intellectual pursuits is quite difficult to turn off when he turns to the everyday problems of existence, particularly when he is dealing with aspects of daily living which are quite meaningful to him. Hence the notorious "artistic temperament" can be seen in large measure as merely the by-product of occupational hypersensitivity.

Joan of Arc: Emotion-Filled Creativity

One of the most striking examples of emotion-filled extra-conscious creativity is that of Joan of Arc, whose "voices" and "visions" told her, with considerable accuracy, what the needs of the French people of her time were. Joan's concepts can be seen most simply as having evolved in her own brain from the interaction of all the experiences and ideas which had impinged on her, and with which she had interacted intellectually. But it was much out of keeping with the customs of her feudal times for a mere peasant girl to arrive at new creative syntheses valuable enough to affect political events in all of France. Hence both she and those about her ascribed the origin of her ideas and feelings to a theistic force whose instrument she was therefore considered to be. This kind of ascription was much less unacceptable to her society; hence, God received the credit for Joan's brilliant grasp of the political necessities of her time.

Revelation, then, is apparently merely a special case of human creativity. The creative product is seen by some as forged outside the human mind, and then thrust into it, rather than correctly recognized as the creative product of a human being's mind

and brain. When the creativity is ascribed to God, rather than to man, it thereby becomes considered scientifically unknowable. It is then seen as the product of mysterious heavenly processes, rather than as a new synthesis of previously unrelated cultural symbolizations within one human's mind. Ascription of knowable human psychological processes to an unknowable God tends therefore to interfere with our determination of the truth which, as the Bible says, will make us free.

It is therefore basically incorrect, I believe, to call creative individuals "sleepwalkers," as Arthur Koestler does, thereby implying that they are controlled, almost like puppets, by greater forces outside them. It would be much more accurate, I submit, to recognize that creative people work hard and consciously to gather their data, and that they work equally hard—and consciously—at testing the hypotheses they formulate. They are not afraid, either of testing, or of discarding the hypotheses when they fall short of the truth.

There is, however, a small grain of truth in Koestler's inaccurate characterization, inasmuch as creative hypotheses are often formulated extra-consciously within human brains. But this engrammatic interaction, based on human experience, results in hypotheses only, which then require verification.

For people to be creative, they must be relatively honest, accurate and unafraid. Dispelling the ignorance-fed mysteries surrounding the creative process, as Freud, Havelock Ellis and Kinsey helped to do with the reproductive process, may reduce further the fears surrounding and inhibiting not only our artists and our scientists but which affect us all. As fear diminishes, so can warmth, love and communication flourish. As they do, perhaps the creativity in all of us can begin to spread its wings.

Summary

Creativity has been defined as "the finding of a new unity in the variety of nature." The neurophysiological process of integrating sensations into "gestalten" is seen as the foundation upon which the human creative process is built.

Human consciousness is defined as the subjective, verbalizable aspect of the process of making motor choices. It has a significant emotional aspect; "every cognition has, potentially at least, an emotive value," as Sherrington[3] pointed out.

Motor choices in any animal are the result of the neurophysiological integration of stimuli, reflexes and memories. In humans, symbolization makes possible the inclusion of ever more data in each particular verbal stimulus. Each word or symbol then becomes represented in the central nervous system by a relatively congealed neurophysiological circuit, called an engram. The interaction within the brain of these engrams comprises human psychology. At those times that the engrams pass through cells in the conceptual speech centers, we are explicitly conscious—in verbalizable terms—of the interaction occurring within us; when the engrams do not include conceptual speech center cells, the engrammatic interaction determining responses to stimuli occurs outside of our consciousness.

Determination of the response to a situation is solving a problem. The solution may or may not be successful. Scientific method is the human codification of the techniques used in successfully solving problems. Its first and third steps, gathering data and testing hypotheses, are seen to be basically conscious and explicit processes, in which verbal symbols are collected, or specific directions for testing are given. The second step of scientific method, the creation of a unifying hypothesis from the diverse data, is, however, quite often an extra-conscious process, the results of which appear in consciousness only afterward.

When the fact cannot be accepted that the new hypothesis or creation is the product of one human's creativity, its origin is often erroneously projected outward to the surrounding world, and particularly onto a theistic figure within it. This inaccurate projection of a human's creativity onto an external theistic figure is part of the process known as "revelation."

The basic emotional modalities are pleasure and pain, which are governed by separate but interdigitating neurophysiological systems. Pleasure can be seen basically as the subjective reflection of the processes leading to approach toward a stimulus, while pain can be seen basically as the subjective reflection of the processes leading to withdrawal or avoidance movements, away from a stimulus. While intense stimulation of the pain system often causes an over-generalized, and therefore ineffective, response, mild stimuli to the pain system, in the form of mild uneasiness, for example, are of considerable value in the creative process.

In humans, uneasiness signals that there is some annoying or painful quality in a situation—or in a response to a stimulus—even before it is possible consciously to define what this painful or annoying aspect might be. Hence feelings are used as a signal in themselves of the possible "rightness" or "wrongness" of a proposed response, a fact of great importance in the creative process. The consequent concentration by a creative person on his own feeling responses produces his well-known hypersensitivity, with the intense emotional responses so necessary in his creative work often being inappropriately carried over into his day-to-day living.

As we know more about the conscious and unconscious processes involved in human choice-making, we will come to learn more about the interpersonal stimuli to both the pain and pleasure systems. Painful stimuli from other people are the most important painful stimuli we experience nowadays, inasmuch as social advance has so considerably reduced the natural dangers to which we are exposed. Perhaps we can foresee a time in the not too distant future when interpersonal stimulation of the pain system, better known as man's inhumanity to man, or man's exploitation of man, can be brought peacefully to an end, thus possibly opening the door to an era of true human brotherhood.

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Inhalant and Intravenous Indoklon in Psychiatric Treatment

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Since 1957 hexafluorodiethyl ether (F_3C-CH_2-O-CH_2-CF_3)—Indoklon—has been used as a convulsive agent in the treatment of psychiatric disorders by Esquibel, Krantz, Kurland, Truitt, et al.[1-4] In February 1959 we began investigations of the properties and actions of Indoklon at Kings Park State Hospital, New York.

Initially, Indoklon was available as a volatile liquid which could be given only by inhalation of its vapor and administered by means of specially designed equipment (Fig. 1). Briefly, the procedure was as follows: One half hour after an intramuscular injection of 0.6 mg. of atropine, the mask, containing the Indoklon saturated gauze in the reservoir, was placed on the patient's face covering both nose and mouth. He was then encouraged to breathe deeply and after 30 to 60 seconds entered into a strong convulsion.

With unmodified seizure, fractures occurred frequently as with unmodified metrazol or ECT. To reduce this hazard, we modified the procedure by administering succinylcholine chloride (SCC) intravenously immediately preceding the application of the mask. This proved impractical, as the paralysis of the respiratory muscles by the SCC prevented the deep inspirations necessary for the transport of the Indoklon vapor into the lungs. A method using positive pressure to force the vapor into the lungs was necessary.

A further modification of the mask was made in which the reservoir containing the Indoklon was attached (Fig. 1) on one side, to the mask, and on the other, to a breathing bag connected by a rubber tube to an oxygen tank. By manual pressure on the bag, previously filled with oxygen, it was possible to force the Indoklon vapor into the lungs evoking a convulsion within 15 to 30 seconds.

Succinylcholine often causes unpleasant feelings of suffocation if the grand mal is not given as soon as the circumoral fasciculations are seen. To circumvent this hazard the patient was anesthetized with a barbiturate prior to the SCC injection. As barbiturates antagonize the action of Indoklon[5,6] larger doses of this agent are required to produce a therapeutic convulsion. These

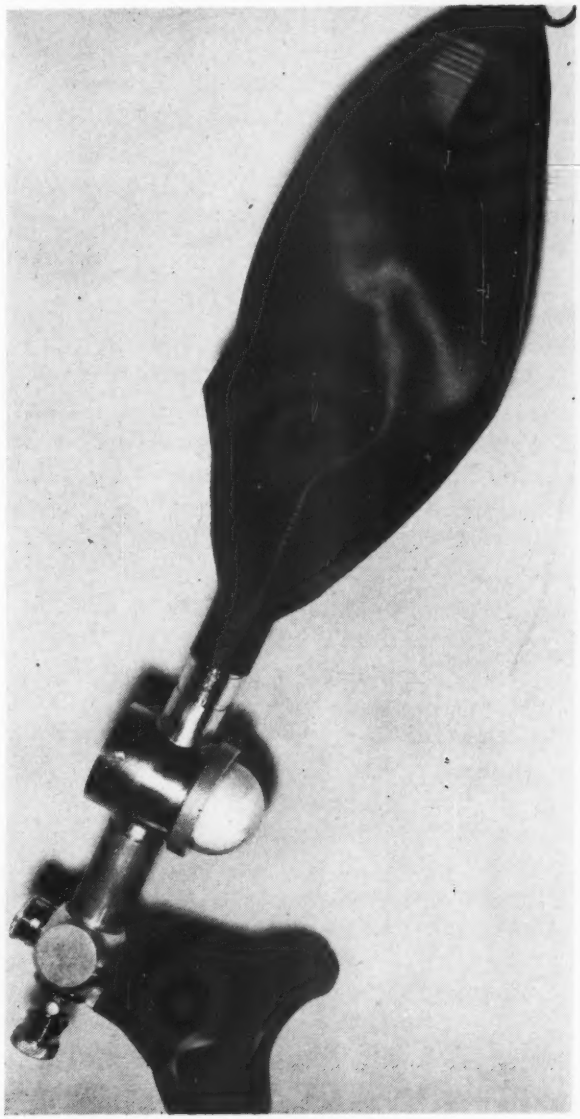

Figure 1.

larger doses require a greater time to administer and the ensuing convulsions may occur when the muscle relaxing effects of the SCC is no longer at its optimum and perhaps at its minimum. Amobarbital (Amytal) in doses up to 500 mg. (7½ grains) was used in some patients and due to its prolonged action was discarded in favor of the shorter acting thiopental (Pentothal).

We found that by adhering to the following technic, smooth, non-violent seizures could be produced: One half hour after the atropine injection, thiopental is slowly given intravenously in doses varying with each patient sufficient to produce anesthesia—75 to 500 mg. (1½ to 7½ grains). Fifteen mg. of SCC is then quickly injected intravenously through the same needle. An oral airway is placed in the patient's mouth. The mask is placed over the patient's face and the Indoklon vapor is forced into the lungs by squeezing (at the rate of 15-20 per minute) the breathing bag which is connected to an open oxygen tank. When myoclonic jerks are first seen (within 10-20 seconds) the mask is removed. Soon thereafter (40-60 seconds) the convulsion follows which is often lengthy, lasting from 60 to 70+ seconds.

With this procedure, approximately 2 cc. of Indoklon is required to produce a convulsion. In some instances these large doses of Indoklon cause multiple seizures. Because of the length of the seizure as well as the high frequency of multiple seizures, most patients become highly confused post convulsively. To avoid occurrence of these complications the technic was altered. Instead of keeping the breathing bag inflated by a continuous flow of oxygen, the bag was simply filled and the oxygen turned off. It was squeezed in the usual manner. This allowed the patient to re-breathe some of the Indoklon he exhaled causing a greater concentration of Indoklon without using a greater supply. With this method 1 to 1½ cc. of Indoklon instead of 2 cc. were used for each patient. With this technic which we are presently using, the convulsions were milder and the incidence of multiple convulsions reduced.

Although we did not carry out comparative studies, in 28 patients treated with Indoklon receiving a total of 20 treatments each twice per week, the clinical results were roughly equivalent to those expected from EST.

In January 1960 an intravenous preparation of Indoklon was made available in which the Indoklon was dissolved in a 5% solution of polyethylene glycol 300 (Carbowax 300). Five cc. of this solution given at the rate of 1 cc. per 5 seconds causes convulsions in most patients.[7] At the outset we thought that since Indoklon is an ether derivative it might also serve as an anesthetic. Should this be so, we could take advantage of this property to eliminate the SCC induced choking effect. To ascertain this point we initially administered, within 10 seconds, 2½ cc. of the Indoklon and then quickly injected 15 mg. of SCC and followed this with the remaining 2½ cc. of Indoklon. The choking sensations were still felt. Next, we administered the entire 5 cc. of Indoklon within 25 seconds and immediately followed with the 15 mg. of SCC. The choking sensation still occurred and we concluded that Indoklon does not have anesthetic properties in the dosage used in our patients.

We also found that with the above technic, in which the SCC followed the Indoklon, 7 to 9 cc. of the latter was needed to produce the seizure while when the SCC preceded the Indoklon only 5 cc. was required. This points to an antagonistic action of SCC on Indoklon.

We attempted further modification of our technic by administering sufficient thiopental to produce anesthesia followed by SCC and Indoklon. With this procedure, higher doses of Indoklon (9 to 10 cc.) were required to produce the seizure as the convulsion threshold was raised. With this technic there was increase in the latent period (the interim between the administration of the SCC and the onset of the convulsion) so that by the time the convulsion took place the effect of the SCC was near its minimum.

Our present technic for the administration of intravenous Indoklon is as follows: Atropine 0.6 mg. is administered one half hour

before the treatment. Fifteen mg. SCC is then given quickly intravenously, followed by 5 cc. of Indoklon given over a period of 25 seconds. This method produces little anxiety in our state hospital patients.

Six patients have been treated in this manner thus far. In contrast to the inhalation method a more accurate dose of Indoklon can be determined for each patient with the intravenous method. As a consequence the seizures are of much shorter duration and multiple seizures rarely occur. There is minimal post convulsive confusion.

Barbiturates and succinylcholine are capable of counteracting the convulsant property of Indoklon. Barbiturates do this by raising the convulsive threshold at the cortical level by interfering with the utilization of oxygen by the neurons. SCC inhibits the Indoklon convulsion only when it is given after the Indoklon has been administered. This is peculiar and can be explained by the assumption that when the SCC is given prior to the Indoklon, its effect has become attenuated by the time (25 seconds) the Indoklon is administered. When the SCC is given after the Indoklon the full force of the action of SCC is brought on the Indoklon. Inasmuch as the inhibition of Indoklon by the SCC occurs in the brain this can be taken as a further proof that SCC has a central action. It is known that SCC inhibits the respiratory center. It may be possible that as a consequence of this inhibition there is a build-up of carbon dioxide which is an anti-convulsant in moderate doses.

Summary

Our experiences with the inhalation and intravenous methods of Indoklon administration have shown that it is safe to administer Indoklon with barbiturates and also with SCC. Unmodified Indoklon shock is strong and results in frequent fractures; while the SCC modified convulsion is soft and free from fractures. It is difficult to control the dose of Indoklon with the inhalation technic which often results in overdosage, prolonged convulsions, multiple convulsions and marked post convulsive confusion. These difficulties may be avoided by the intravenous administration of Indoklon by reason of the lesser amounts of Indoklon required to bring on a convulsion which is milder and relatively free from confusion. However, the intravenous method has the disadvantage of causing frequent thromboses in the anticubital veins.

Our experience with inhalant and intravenous Indoklon has been limited but so far therapeutic results parallel those of electroshock therapy. Indoklon causes less anxiety than EST. So far, we have not found any special indication for Indoklon. However, it seems that it may be of special value in chronic schizophrenics who have not reacted to other methods of treatment. Indoklon may be recommended as a safe, alternate procedure to EST.

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Electroencephalography and the Sedation Threshold

(Comparative Studies on Drug-Induced Phenomena)

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The use of the electroencephalogram to study the effects of drugs upon brain potentials has been known since the development of electroencephalography by Hans Berger in 1929. He studied electroencephalographic signs in the central nervous system due to the action of barbital, morphine, cocaine, chloroform and other substances then in common clinical use. Barbiturates and their effect upon the electroencephalogram have been widely studied.[3,8,14] Earlier report indicated a similarity between records obtained under barbiturate sedation and those of natural sleep. More recent reports emphasize the initial appearance of fast activity preceding the loss of consciousness. The effects of intravenous barbiturates on the electroencephalogram have been attributed to the dosage, to the interval before recording and to characteristics of the individual subject.

A summary of the literature on the effects of barbiturates upon the electrical activity of the brain indicates a general, although not invariable, increase in amplitude and appearance of fast or beta activity after small doses which produce minimal psychic effects. Larger doses sufficient to produce sleep are associated with the appearance of dominant slow rhythms, spindles, and other electroencephalographic features of a natural sleep pattern. Specific observations on the effect of the intravenous administration of amobarbital sodium on the human electroencephalogram were consistent with the reports described above on the electroencephalographic changes under the effect of barbiturates in general.[13]

It has been established that any condition which modifies the level of consciousness or the level of physiological activity, also produces a concomitant change in the pattern of electroencephalograms. As a record of the physiological activity of the cerebral cortex, the electroencephalogram seems to be modified, temporarily or permanently, by ethyl alcohol. Although the literature on the chemically induced alterations in the brain potentials is vast, the effect of ethyl alcohol on these waves has not been examined with sufficient thoroughness and the findings are diverse and sometimes contradictory.[4,5,9,14] Some reported an increase in the amplitude of brain potentials and slowing of the rhythm during alcoholic stupor. Others stated that there was progressive slowing of the brain waves of chronic alcoholics. A third group of investigators demonstrated that the electroencephalographic patterns of chronic alcoholics, without alcohol, were not particularly abnormal and that the electroencephalographic patterns of average young men, in a state of acute alcoholic intoxication, were also nearly normal.

A study has been undertaken to investigate the psychological and physiological changes in the central nervous system under the effect of central nervous system depressant drugs—namely, amobarbital sodium and ethyl alcohol. The levels of the sedation thresholds,[11,12] for these two drugs were used for the comparative evaluation of their effects. The electroencephalographic recordings have been previously used by Shagass[10,13] as an indicator of the point of the sedation threshold for amobarbital sodium. He reported that the point of inflection in the amplitude curve of the frontal electroencephalographic tracings coincided with the sedation threshold of amobarbital sodium. He also indicated that the inflection point must occur within 80 seconds of the clinical observation of slurred speech.

This study explores the relationship between various manifestations that have been designated "anxiety" and the amount of central nervous system depressants required to

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produce the level of the sedation threshold. The assumption was that the psychological state of the organism determines the effect of the drug given to him. The study also investigates the consistency in the effects of the two drugs—amobarbital sodium and ethyl alcohol—which were reported, separately, to produce some relatively comparable psychological changes. It also explores the reliability of the electroencephalographic tracings as an indicator of the point of the sedation threshold in studies of this nature.

Method of Study

A group of 24 patients presenting varying degrees of "anxiety" were obtained from the psychiatric division of the Kings County Hospital Center. The subjects were selected on the following basis: The present admission was the first to a psychiatric hospital and they were white males with an age range of 16 to 36 years. These subjects had never received any type of shock therapy and did not show any evidence of encephalopathy on physical, mental, and laboratory examinations. Clinically they presented a picture of predominantly psychoneurotic or character disorder. The group of subjects used was thus a selected one. This selectivity was felt desirable to secure more or less homogeneous sociopsychological patterns and to avoid as much as possible the interference of environmental, racial, and sex differences, which are known to be potential handicaps in studies of this nature. Such a group was also thought to reflect any existing differences or trends to a degree that would permit achievement of statistical significance. On each subject included in the study the following data were obtained:[7]

1. Basic identifying information, including age, sex, race, degree of education, weight, and height.

2. An evaluation of the degree of his anxiety using three measures: clinical judgment, the Figure-Drawing test, and Taylor's Anxiety Scale.

3. The sedation thresholds for amobarbital sodium and ethyl alcohol.

4. The performance on four psychological and psychomotor tests under the effects of amobarbital sodium, ethyl alcohol, and a no-drug condition. These tests are the sentence completion, the two-hand coordination, the steadiness, and the tapping speed test.

5. Electroencephalographic recordings of the brain waves under the effects of amobarbital sodium, ethyl alcohol and a "no-drug" condition. Since the effect of these drugs on the brain waves is greatest in the frontal areas, bifrontal tracings were used to measure changes. Since the bifrontal recording is subject to contamination with muscle artifact, a record from sagittal fronto-central electrodes was also taken. Patterns from the parietal and occipital regions of the brain were obtained.

This information was then subjected to analysis, considering each variable in an effort to clarify the relationship of the sedation threshold of one drug to that of the other and the relations between these thresholds and the degree of anxiety of the subject. An evaluation of the physiological, psychological, and psychomotor changes at the sedation threshold levels was also undertaken.

Technique of Drug Administration

The injection was preceded by routine examination of the physical condition. It was given only after the lapse of at least 1½ hours after a meal to prevent gastrointestinal and other disturbances. Two nurses assisted in this phase of the experiment. Their presence was thought advisable for the following purposes: to help with the preparation of the drug solution and with its administration under aseptic techniques; to record responses, and time at various stages of the experiment; to attend the electroencephalogram; to help with the administration of stimulants or other necessary measures in cases of emergency, such as respiratory distress or sudden drop of blood pressure. It also facilitates matters to have assistants in case of release of great affect occurs during or after drug administration.

The injection of amobarbital sodium was made up so that 1 cc. of sterile water contained 1.5 grains (0.10 gm.) of amobarbital sodium. The solution was freshly prepared before every injection. The drug was in-

jected intravenously at the rate of 1 cc. per 40-second interval. This was followed by a 20-second period during which the subject was tested for slurred speech. The injection, followed by testing, was repeated in the same way until the subject had manifested slurring speech on two consecutive testing periods.

The apparatus that was employed to administer ethyl alcohol intravenously consists of a container for each of the following solutions: first, isotonic saline solution and, second, a solution of pure ethyl alcohol and isotonic saline solution in the proportions of 15 cc. of 95% ethyl alcohol to 85 cc. of isotonic saline solution. The tubes from these containers run to a Y-connector, which is equipped with a two-way stopcock, so that the solution in either bottle may be infused. With this type of apparatus the infusion can be administered by gravity. The whole apparatus was sterilized previous to injection, and the usual antiseptic precautions taken in preparing the site of injection. The rate of flow was adjusted, using clamps, to 20 cc. per minute. By running the isotonic saline solution before and after the administration of the drug, the danger of thrombosis of the vein used is greatly reduced. Brain waves recorded during the injection of saline were also thought to have value as a control for the effect of the insertion of the needle in comparing the saline effects with drug effects. The point of the sedation threshold, again, was that at which the subject manifested slurred speech on two consecutive testing periods.

The experiment was designed so that all possible permutations of the sequence of the three conditions (no-drug, amobarbital sodium, and ethyl alcohol) and the order of the four psychological and psychomotor tests were used, counter-balancing the effect of sequence, like learning experience, and that of order, like the duration of drug effect.

Results

This study, so designed as to meet the needs of several objectives, has revealed many findings of both importance and interest and has pointed out questions of potential value in psychosomatic research. The present report will limit itself to the presentation and discussion of the electroencephalographic findings.

The brain waves were recorded for each subject included in this study under normal conditions and under the effects of amobarbital sodium and ethyl alcohol. Electroencephalographic findings were thought to be of value in two respects: first to demonstrate and compare the effects of drugs on brain potentials, second, to ascertain the value of electroencephalographic changes as a criterion in determining the level of the sedation threshold.

Under "no-drug" condition, the electroencephalograms of the 24 subjects included in the study were all within the range of "normal" even though the electroencephalogram for each person was unique for him. They showed dominant 8 to 12 per second activity and there were no abnormally slow or abnormally fast activity. Some tracings showed notched waves, others partially "rectified" waves with U or N-shapes in the same frequency range. These are not considered abnormal, for they have been found by many investigators not to correlate with any dysfunction. In general there was no unusual degree of difference between activity from homologous areas. The tracings for the individual were more or less symmetrical.

The intravenous administration of amobarbital sodium produced definite changes in the electroencephalogram. It invariably evoked a characteristic change in the wave pattern, marked by the appearance of sequences of higher frequency waves, 20 to 25 per second, and an increase in amplitude. The change was most prominent in the frontal leads. The response to the intravenous drug was grossly similar in all the cases.

An attempt was made to measure the change in the amplitudes of the brain waves produced by the injection of amobarbital sodium. As was previously mentioned, some investigators reported that the point of inflection on the dosage response curve of amplitudes coincided with the clinically observed slurred speech. In this investigation

such an approach was found to be impractical in the absence of an automatic frequency analyzer. Measurement of the electroencephalogram done on samples by a precise hand method yielded unreliable results. To obtain substantial reliability, every wave traced within a period of 3 to 4 minutes should be measured, a method which yields results comparable to those obtained by the automatic frequency analyzer. The hand technique proved to be extremely impractical in this respect and the electroencephalographic correlant to the slurred speech as a criterion for the level of the sedation threshold was omitted.

The effects of the intravenous administration of ethyl alcohol on the cortical potentials were on the whole slight. On some occasions ethyl alcohol produced fast activity characterized by rapid small amplitude waves. In other cases there was some slowing of the brain waves. The general impression was, however, that ethyl alcohol, injected intravenously, in doses enough to produce slurred speech did not produce any notable changes in the brain potentials.

Discussion

Evidence has accumulated pointing to an association between certain subnarcotic doses of barbiturates and ethyl alcohol and the development of a certain stage of psychological performance manifested by clinical criteria, psychosomatic pattern disturbances and certain electroencephalographic changes. This specific level of psychological performance—the sedation threshold level—has received considerable attention from investigators due to its potential value as a standardized level for comparative study of behavioral patterns. Electroencephalographic changes and concomitant slurred speech were described as the criteria for reaching this level.

The electroencephalogram used in this investigation as a record of physiological activity of the cerebral cortex showed slight and insignificant changes under the influence of ethyl alcohol at the level of clinically observed slurred speech. Amobarbital sodium, however, produced definite changes at that level, marked by increase in frequency and amplitude of the electroencephalographic tracings. This fast activity has been ascribed not to an acceleration of cortical activity but, on the contrary, to a slowing of faster, low voltage activity. In fact all soporific drugs including ethyl alcohol are known to produce similar effect. It seems that the doses of ethyl alcohol used in this study, though enough to produce slurred speech, were not sufficient to produce the above mentioned changes in the electroencephalographic patterns.

In order to interpret the difference in action of amobarbital sodium and ethyl alcohol on the electroencephalogram it was imperative to search the literature on the thinking concerning the nature of the electrical discharges recorded from the brain. Unfortunately this body of information presents the most divergent extremes of interpretation.[7] The initial fast activity produced by the effect of amobarbital sodium on the brain waves is known to be followed by a slow type of record on increasing the dose of the drug until the subject reaches the stage of sleep. This transition from slow to fast is explained by several hypotheses.[1,2] A fairly well accepted theory is that the initial state of acceleration is due to the appearance of acid metabolites. This is followed by a slow record as a result of the accumulation of metabolites. Another theory is that there is an early depression of cortical activity followed by sharp transition to subcortical dominance.

The physiological bases for the effect of ethyl alcohol on the brain waves has not been studied thoroughly enough to permit an adequate interpretation of the findings in this study.

Summary

Twenty-four patients presenting varying degrees of anxiety were selected from the psychiatric unit of the Kings County Hospital Center. Each patient was subjected to evaluation for the degree of anxiety, utilizing several techniques. Each subject was then given a series of psychological and psychomotor tests under three different condi-

tions: no-drug, amobarbital sodium, and ethyl alcohol, at the levels of their sedation thresholds. Comparative study of electroencephalographic recordings under the effects of no-drug and drug conditions was made at the levels of slurred speech. The electroencephalogram showed definite increase in frequency and amplitude of the brain waves under the effect of amobarbital sodium. The effects of ethyl alcohol on the brain potentials were slight and inconsistent.

The electroencephalographic tracings were eliminated as criteria for the level of the sedation threshold. In order to determine the point of inflection on a reliable dosage-response curve of amplitude on the electroencephalogram, in the absence of an automatic analyzer every wave traced within a period of three to four minutes was measured and included in the computation since the reliability of samples selected randomly from the record is low. To perform this task by the precise hand technique is extremely laborious and impractical especially with previous reports discouraging the objective index.[6]

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SEVENTH ANNUAL MEETING
ACADEMY OF PSYCHOSOMATIC MEDICINE

The Academy of Psychosomatic Medicine will hold its Seventh Annual Meeting at the Benjamin Franklin Hotel in Philadelphia, Pa., from October 13th to 15th, 1960. In keeping with the general theme, "An Inter-Disciplinary Approach to the Emotional Problems Encountered in Medical Practice," participants will include generalists and specialists in clinical medicine, cardiology, allergy, obstetrics and gynecology, plastic surgery and neurosurgery, as well as psychiatrists, psychoanalysts, and researchers in psychopharmacology. The three day program includes panels and symposia on: Interview Techniques, Drugs and Research, Organic Aspects of Psychiatry, Group Therapy, Psychopharmacology, Drugs and Psychotherapy, Hypnosis, and a variety of other topics. For further information, contact Bertram B. Moss, M.D., Secretary, 55 E. Washington, Suite 1035, Chicago 2, Illinois.

Combination of Antidepressant with Electroshock Therapy

EDWIN DUNLOP, M.D.

During 1959 more true antidepressants were introduced than in any other year. Catron, Marplan, Nardil, Niamid, and Tofranil appeared that year: Iproniazid which came into active use in 1957 was at that time a welcome addition to the armamentarium of the psychiatrist dealing with large numbers of depressed patients. "A review of 500 admissions to a private sanitarium last year revealed that 40% of the patients were sufficiently depressed to merit electroshock therapy" "A comparable study in office practice seen over the same time indicates that the same if not a greater proportion of depressed reactions of all types were treated".[1] A high percentage of these were patients whose depressions had recurred either in a cycle or on an erratic basis.

For 20 years, electroshock therapy has been in vogue and this treatment is widely used. It's usefulness, safety and widespread acceptance has increased with the years. Electroshock has remained a specific for the treatments of depressions especially those of the endogenous type. It has been utilized in other psychiatric diagnosis with less certainty of result. There is no more gratifying experience than of reversing a psychotic depression with attendent symptoms of mental and motor retardation, fatigue, hopelessness, guilt and despair. This is especially true when clinical improvement can be felt by the patient and seen by others within the first two or three days of treatment.

It's position as a desirable therapy in psychiatry is highly respected. So much so that electroshock is the yardstick or operational concept in determining the value of other therapies to produce equal or possibly better results.

During 1959 we treated over 300 patients with depressive components with antidepressive medications, as follows:

Drug	*Dosage*	*No.*
Catron	6 mg.—1 t.i.d. or b.i.d.	40
Marplan	10 mg.—1 q.i.d.	50
Nardil	15 mg.—1 t.i.d.	80
Niamid	25 mg.—1 q.i.d.	50
Tofranil	25 mg.—1 t.i.d. or q.i.d.	80
Total		300

The medications mentioned above were prescribed in the dosage recommended by the respective manufacturers. No advantage was found by increasing the dosage beyond this range.

It is advisable that patients be kept on antidepressant medicine long after their apparent recovery. Maintenance dosage of one tablet daily is generally sufficient to prevent a relapse but should be continued.

It was our practice to prescribe for these patients the recommended dose of the antidepressant whether hospitalized or office patients. Failure of appreciable improvement within 14 days, or any other unsatisfactory response to the medication led to electroshock therapy being superimposed at the rate of three treatments per week.

Techniques of Electroshock Therapy:

Our in-patients and out-patients were treated under essentially the same conditions. Patients are placed on a comfortable innerspring type bed. One pillow is placed under the head, dentures are removed. The preferred time of treatment is in the morning before any food has been consumed. All treatments are combined with anesthesia and muscle relaxants. The single injection technique has proven most satisfactory. A 20 cc. syringe into which is drawn 10 cc. of 2.5 per cent solutions of Surital or Neraval is used. To this is added 1/75 gr. atropine sulfate and 20 mg. succinycholine chloride; (Anectine, Burroughs Wellcome). The combined injection through a 20 needle is administered in about 10 seconds. Relaxation develops during the first 30 to 40 seconds and muscle fasciculation may be noticed shortly after the injection has been given.

From Fuller Memorial Sanitarium, South Attleboro, Massachusetts.

At this time, the patient is given oxygen, administered with positive pressure until a total of 60 seconds has elapsed from the introduction of the medications and then convulsive therapy is given by a Reiter machine. Spontaneous respiration usually occurs within a few seconds after the treatment but may be quite shallow in character for a minute or two. The patient can be helped over this period of hypoventilation by oxygen administered under positive pressure until normal respiration is resumed. This has been our accepted technique for many years and it has proven eminently satisfactory. Occasionally modification of the dose of succinycholine chloride is required and only when pathological conditions of the bones exist do we exceed 40 mg.

It is our aim to minimize the convulsion and only mild sedation rather than full anesthesia is preferred. The less anesthetic substance introduced, the better. This enables the patient to recover rapidly with less respiratory embarrasment, and out-patients are often dressed and ready to leave within 30 minutes after arrival for treatment. The advent of the antidepressant medications has not yet altered our mode of giving electroshock treatments and we do not find that these substances potentiate anesthesia or muscle relaxants. We have not experienced any untoward reaction which could be blamed on the combination of any antidepressant drug and modified electroshock therapy.

Many patients who previously recovered from depressive reactions with electroshock treatments, have found that 36% less treatment is required when antidepressants were added. This economy of ECT justifies the combination of antidepressants with electroshock therapy. However, we do not feel that antidepressants and electroshock therapy given simultaneously will produce this benefit. The antidepressant substance must be administered for at least 14 days to overcome the lag period associated with this type of medication.

Conclusion

Electroshock therapy occupies an important place in the treatment of depressions, although some depressions respond to electroshock therapy and the treatment itself is not without hazard—postshock confusion, fractures, dislocations and even cardiac arrests are risks in spite of all our precautions. Antidepressants are not a replacement for shock therapy in all instances. Having now at our disposal two excellent means by which we can successfully treat patients with depressive illness, we should utilize these benefits singularly or in combination as required. Our objective should be the recovery of the patient rather than rigid adherence to one or the other method of treatment.

Our series of over 300 patients treated for depressions with antidepressants such as, Catron, Marplan, Nardil, Niamid and Tofranil have resulted in no untoward reactions and more than 100 of them were treated with psychopharmaceutical antidepressants combined with modified ECT. We feel that this method merits wider use as it has produced gratifying results with no significant complications. At no time did there appear to be any difference in the patient's reaction during electroconvulsive therapy, when taking an antidepressant additionally as compared with ECT given without these drugs.

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Promazine Hydrochloride and Combined Promazine Hydrochloride-Meprobamate Treatment of Hospitalized Psychotic Patients

GEORGE VLAVIANOS, M.D., and LUDWIG FINK, M.D.

In July 1956, the authors initiated the use of promazine hydrochloride on chronic mental patients. The 13 month clinical experience with this drug as used with 200 progressively selected patients was published.[1,2] This is a report covering 29 months clinical experience with promazine hydrochloride and 12 months administration of promazine hydrochloride and meprobamate on 100 additional patients, 69 of whom were placed on combined medication.

These additional 100 male patients were between 24 and 73 years of age. They were chronic, severely ill psychotics. The duration of the psychoses ranged from 3 to 25 years. Diagnostic distribution was as follows: a) 92 schizophrenia, b) 1 psychoneurosis, c) 5 psychoses due to alcoholism, and d) 2 psychoses with psychopathic personality. These 100 patients had been on various tranquilizing drugs for a period from 3 to 18 months; 17 received simultaneously ECT, three insulin coma and one insulin coma combined with ECT.

Basically, patient criteria remained the same as in our previous publications. The method of use was modified by reason of our greater experience and the progress of psychopharmacology. Encouraged by the relative safety of promazine under cautious individual application, we increased the dosage of this drug more liberally in refractory cases. In nine extremely unmanageable, acutely hallucinating patients, it was necessary to gradually increase the daily dosage to a maximum of 4,500 mg. for 14 to 42 days until we succeeded in stabilizing control of the psychomotor excitement. After establishing control, dosages were reduced and the patients maintained on optimal dosage of 200 to 300 mg. TID. With the introduction of meprobamate in selected cases we replaced the high dosage of promazine with a combined application, seeking an additive effect.

Our rationale for the use of these drugs was as follows: In animal experiments, promazine hydrochloride and meprobamate had shown selective site and mode of action, being considered as "autonomic suppressants" and "central relaxants" respectively. Meprobamate caused a characteristic "taming" effect on animals which had previously manifested fear and aggressiveness.[3-6] Clinically, it became known for its dampening effect on agitation and for its ability to relax muscles.[7-9]

The criteria for patient selection were: 1) Meprobamate was added to promazine hydrochloride in selected cases showing outstanding features of restlessness or agitation, aggressiveness, fearfulness, tension, irritability and insomnia, and (in schizophrenic patients) agitation, fearfulness with depressive features. 2) Promazine hydrochloride alone was administered to acutely hallucinated, noisy patients without motor activity and outstanding emotional involvement. 3) As in the authors' experience there are no reliable energizing agents available as yet, we continued to make "a breakthrough trial" with this drug in the catatonic, negativistic patients. When there was no response, electroshock treatment was applied. After ECT we resumed promazine hydrochloride and included them in group therapy sessions. 4) Neither drug was used on patients with endogenous depression and suicidal tendencies, since we believe that in these cases electroshock is the treatment of choice. (Our experience with antidepressant drugs is still not conclusive.)

From Kings Park State Hospital, Kings Park, Long Island, New York.

Promazine hydrochloride was used as Sparine and meprobamate as Equanil, the trade names of Wyeth Laboratories.

With continuous observation and individual variation of medication, the optimal daily dosage in acutely disturbed patients, was found to be a combination of 900 to 1,500 mg. promazine hydrochloride and 1,200 mg. of meprobamate. With improvement, dosages were reduced and maintenance dosages were generally 200 mg. TID promazine, and 400 mg. BID meprobamate.

Side Effects[10-18]

With promazine alone, in two patients out of the nine on the high dosage, we observed difficulty in speech (dysarthria) and severe drowsiness, although they responded to external stimuli. These symptoms disappeared over a maximum 18 day period and reduction of dosage, after psychomotor excitement had been controlled. In three cases out of 300 under a dosage of 900, 2,400 and 3,000 mg. respectively, grand mal seizures occurred. Promazine was discontinued for 10 days and then resumed at a level of 100 mg. TID. There were no recurrences of seizures in two of the three patients. The third patient when again placed on 100 mg. TID, presented one more seizure after 13 days. He was given phenobarbital 1½ grs. BID for two months in addition to promazine. Since then, this patient has been on promazine alone (300 mg. daily) for eight months with no recurrence of seizures. Three patients on a dosage of 200 to 300 mg. TID presented high phosphatase levels (11%, 15%, 21%), which were discovered through our monthly laboratory check. After reduction of dosage to 100 mg. TID, normal phosphatase levels were found in two patients. Medication was discontinued on the third because of his improved mental condition.

In three patients on promazine alone, and in four patients on combined promazine-meprobamate medication, we observed an inclination to repeated hypotension, dizziness or momentary fainting regardless of dosage or routes of administration. The patients were put to bed, sugar solutions were given orally and 15 drops of Coramine were administered as often as indicated. These complications were not considered contraindications to continuation of the tranquilizers. Twelve patients out of the 69 on combined medication, developed mild dermatitis with rash and itching in different body regions. When medication was discontinued the rash subsided. Therapy was reinstituted in all patients. Recurrence of rash was noted in three and their medication was again discontinued.

It is believed that the dermatological reactions were due to individual sensitivity, probably on an allergic basis regardless of dosage and duration or administration of the drug. Since occasional allergic skin reactions have been observed with meprobamate medication[19] but not with promazine, it was believed that the former was the excitant factor. The reactions were not considered an expression of biochemical incompatibility of the drugs. No other side effects were noted. There was no habituation or aggravation of mental symptoms which could be attributed to the medications.

It is our conclusion that high dosages of promazine hydrochloride brought about a tranquilizing effect on acutely disturbed patients refractory to the average dosages previously used. The combination of promazine hydrochloride and meprobamate proved clinically more favorable in selected cases. Dosages may be kept at a lower level with the same therapeutic effect although there must be an individual adjustment. The high dosage of promazine, as well as the joint application of both drugs, has reduced the need for electroshock and insulin therapies and minimized, on our patient material at least, resort to lobotomy. The side effects observed were largely reversible.

The use of promazine hydrochloride and meprobamate on our chronic ward patients has demonstrated that both drugs are valuable adjuncts in the psychopharmacological armamentarium of the ward physician. Psychomotor excitement and destructive behavior could generally be controlled and the mental status of the patient so influenced that psychotherapeutic contacts were facilitated and a more meaningful and therapeutic climate developed. The combination of drug therapy, psychotherapy and environmental psychotherapeutic influence was instrumen-

tal in establishing a liberalized program. The institution of the Open Ward and Patient Self-Government have aided in the resocialization of the patients. Out of three hundred patients 83 have been released; only 17 of these were returned.[20] Alcohol was a contributing factor in ten of the 17.

We feel that a 29 month observation period is still too short for an adequate appraisal of the clinical effectiveness of any drug,[21] or for the exclusion of any pathogenic properties under long-term use. We must remain aware that these drugs are palliative, not curative. How far it will be possible to alleviate the chronicity of the basic mental disturbance in patients treated with tranquilizers remains unknown. Studies to determine whether prolonged use of psychotherapeutic drugs may cause cancer are felt to be of vital importance.

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Use of Trifluoperazine in Chronic Psychoses

LEWIS R. RODDY, M.D.

Trifluoperazine (Stelazine) has been found effective in chronic psychoses resistant to other forms of therapy.[1-4] Although a variety of side effects had been reported, those relating to the extrapyramidal system seem to be the most common.[2,5-7] Some researchers have reported weight changes and cardiovascular changes.[1,2,5,6]

The purpose of this study was to observe the effects of trifluoperazine on a group of chronic psychotics who had been unresponsive to many other forms of treatment. In an effort to observe individual tolerance to trifluoperazine and to magnify therapeutic and side effects large dosage was used.

Method

A group of 30 chronic, "regressed," male patients was selected from the worst ward in the hospital. They were the most apathetic, withdrawn and deteriorated patients on the ward. The mean duration of recognized illness was 20.3 years. The average length of continuous hospitalization was 15 years. Table I summarizes the diagnostic categories of the patients studied. A large variety of other treatments had been used unsuccessfully with these patients, as indicated in Table II.

Trifluoperazine was administered by mouth in tablet form. All patients were started on a dosage of ten milligrams three times a day. Thereafter, dosage was individualized, increasing it if improvement was not apparent and decreasing it if side effects interfered with the patient's functioning. The median maximum dosage used was 90 milligrams per day (range 30 to 130 milligrams per day). The median duration of treatment was 4½ months (range 3 to 7 months).

Twice each month patients were evaluated for presence of delusions, hallucinations, communicativeness, rationality, activity, orientation, social activity, motivation and spontanety. Over-all evaluations were graded on a simple scale of no or minimal improvement, moderate improvement, and marked improvement. At the same time these evaluations were made, blood pressure, pulse rate, weight and the presence of various side effects were noted.

In an effort to minimize the effect on the patients of increased contact with the ward physician, the time spent evaluating the patients was kept to an absolute minimum. To prevent identification of the experimental group as a special group within the ward population, other patients were similarly examined each time members of the experimental group were evaluated. Also most of the other patients on the ward were receiving oral medication.

Results

Eleven patients showed no or minimal change. There was moderate improvement in 12 and marked improvement in seven. In terms of disposition of the patients, nine re-

TABLE I

Diagnostic Categories

Schizophrenic Reactions	
Simple type	3
Chronic undifferentiated type	2
Catatonic type	11
Hebephrenic type	5
Paranoid type	6
Schizo-affective type	1
Mental deficiency with functional psychotic reaction	1
Psychosis associated with syphilitic menino-encephalitis	1

TABLE II

Unsuccessful Previous Forms of Therapy

Type of Therapy	*No. Pts.*
Pentylenetetrazol (Metrazol)	1
Electroshock therapy	22
Insulin coma therapy	2
Lobotomy	5
Reserpine	2
Chlorpromazine (Thorazine)	22
Prochlorperazine (Compazine)	9
Perphenazine (Trilafon)	1
Trifluopromazine (Vesprin)	8
Iproniazid (Marsilid)	4
Methylphenidate (Ritalin)	2

From Eastern State Hospital, Williamsburg, Va.

mained on the original ward, 17 were transferred to better wards (and many of them were able to perform useful tasks in the hospital), and four were released or ready for release from the hospital. Table III summarizes the therapeutic results.

Therapeutic effects were observable early in the course of treatment with trifl.uoperazine. Of those patients who improved, all but one showed improvement during the first month of treatment. The median duration of treatment to produce maximum improvement was four months.

Side effects were observed in the majority of patients. In most cases they did not alter the course of treatment nor therapeutic process. Where side effects were unacceptably severe, reduction of the dosage of trifluoperazine and/or addition of trihexyphenidyl (Artane) to the regimen served promptly to alleviate them. The most commonly observed side effects were cardiovascular and weight changes. Many manifested extrapyramidal symptoms. The incidence of side effects is summarized in Table IV. Of those who had changes in weight, 17 lost an average of 12 pounds and seven gained an average of 12 pounds.

Thirteen patients had a persistent increase in pulse rate, averaging 22 beats per minute increase. Seven manifested a slowing of the pulse by an average of 17 beats per minute. Only those cases that manifested a persistent change in blood pressure of 15 mm. Hg. systolic and/or 10 mm. Hg. diastolic or more were recorded as showing change in blood pressure. Two patients had a persistent increase. Their mean increase was 23 mm. Hg. systolic and 27 mm. Hg. diastolic. Of the 12 patients whose blood pressure was decreased, the mean decrease in systolic pressure was 29 mm. Hg. and the mean decrease in diastolic pressure was 17 mm. Hg.

Monthly laboratory evaluation included total and differential white blood cell counts, hemoglobin determinations, tests for presence of bile in the urine, and determination of urine specific gravity. There were no changes beyond the usually accepted limits of normal.

TABLE III

Results of Treatment

No or minimal change	11	(36.6%)
Moderate improvement	12	(40.0%)
Marked improvement	7	(23.3%)
Remaining on original ward	9	(30.0%)
Transferred to better wards	17	(56.6%)
Ready for release from hospital	3	(10.0%)
Released from hospital	1	(3.3%)

TABLE IV

Occurrence of Side Effects

Drowsiness	1
Dermatitis	1
Insomnia	2
Dyskinesia	2
Parkinsonism	5
Akathisia	9
Change in blood pressure	14
Change in pulse rate	20
Change in weight	24

Summary and Conclusion

It appears that trifluoperazine served to improve the majority of patients in the group studied. This seems significant in view of the previous refractoriness of these patients to other drug treatments.

Side effects were observed in the majority, but were easily controlled by adjusting the dosage of trifluoperazine and/or adding trihexyphenidyl to the regimen. None of the patients developed blood dyscrasia, and neither renal nor hepatic malfunction was observed.

Relatively large doses of trifluoperazine were used. The apparent absence of any permanent untoward effects suggests that there is a wide margin of safety.

Author's Note: Trifluoperazine used in this study was supplied by Smith, Kline and French Laboratories, Philadelphia, under their tradename Stelazine.

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Age Regression by Hypnosis

CORNELIA B. WILBUR, M.D.

At the outset I would like to make some reference to the utilization of hypnosis in other medical specialties than psychiatry. Generally speaking some use of hypnosis may be made in any medical condition which has an emotional component—whether the local disturbance is a factor in the production of the illness or is merely the result of organic distress. For example some cases of neuroses with cardiac manifestations respond to hypnotic therapy directed at the underlying neuroses while other patients will respond where the anxiety and emotional distress result from the organic heart disease. In both types of cases there may be an improvement in the general sense of well being as well as in the circulatory function. The best results may be anticipated in cases where the symptoms are primarily emotionally determined.

Broadly speaking the anxiety underlying psychosomatic conditions may be relieved by channeling the original impulses through the autonomic nervous system into the visceral organs resulting in symptoms and complaints. These reactions represent the visceral expression of anxiety which is thereby prevented from becoming conscious. The symptoms are due to a chronic and exaggerated state of the normal physiology by the emotions where the feeling of the subject is in part repressed. The psychogenic gastrointestinal syndromes including peptic ulcer-like reactions, chronic gastritis, mucous colitis, constipation, "heart burn"—hyper-acidity—"pylorospasm," irritable colon, may be considered first. Various writers[2-4] describe the peptic-ulcer conflicts as developing from an unsconscious yearning for a dependent relationship and a reactive striving for a certain independence. Recurrent ulceration following sub-total gastrectomy may be explained partly by the conflicting situation persisting or reappearing in the presence of sufficient remaining acid and pepsin bearing glandular tissue. The post gastrotomy syndrome of weakness, tiredness, sweating, lassitude and prostration may be observed in most cases whose conflicts have not been solved or where they were unable to meet the problem of the moment adequately. Where there has been cooperation in the pooling of somatic and psychologic knowledge in the evaluation and treatment of these cases, hypnotic therapy, intelligently applied, has been effective.

Cases of anorexia nervosa have responded dramatically to hypnotherapy. Nearly all investigators emphasize the factor of the child-parent relationship, especially to the mother, as the most important factor in the disease. Promise of success with combined hormonal and psychiatric approach to this problem is clearly shown when patients with anorexia nervosa are treated with ACTH or cortisone since the over-all clinical improvement which the steroids produce facilitates the psychiatric management.

Psychogenic cardiovascular reactions such as paroxyzmal tachycardia, pseudo-angina, essential hypertension, neuro-circulatory aesthenia without subjective anxiety, etc., respond to the use of hypnotherapy in addition to medical management. Doubt in the patient's mind as to the integrity of the heart is a frequent cause of chronic incapacity that is sometimes difficult to alleviate in a neurotic patient. In hypertension, Alexander[5] came to the conclusion that the early fluctuating phase is a manifestation of a psychoneurotic condition due to excessive and inhibited hostile impulses.

Dunbar[6] and Wolff[4] postulate that this tension is part of the whole defense mechanism, psychologically and physiologically, a general attitude of being on guard. Hypnotherapy directed toward reducing these factors met with encouraging results in selected cases. Good results have been obtained in cases of essential hypertension, especially in the younger and middle age group, following

From Falkirk Hospital, Central Valley, N. Y.

abreaction under hypnosis. The comparatively short duration of improvement may be extended by repeated hypnotic interviews and reorganization of attitudes and objectives. In patients with extra systole, the life situation and emotional state have been found relevant to the occurrence of the arrythmias. The excitability of the heart may be significantly altered by a prolonged hyperactivity of the cardiac muscle during anxiety with tachycardia and increased stroke volume. Structurally, diseased hearts are not able to stand the strain of such hyperactivity and more readily develop an altered excitability. Extra systoles are common in patients with structural heart disease. In cases with extra systole, suggestions under hypnosis may be given which tend to create a more peaceful and serene attitude thus limiting the extra systoles.

Psychogenic genito-urinary reactions include enuresis, dysuria, impotence, frigidity, menstrual disturbances etc. In cases which are obviously psychoneurotic the psychiatrist may need to go further than hypnotherapy of short duration. Several cases of enuresis treated with hypnotic suggestion or hypnotherapy have been reported in the literature. Psychogenic impotence and frigidity have been treated through hypnosis, especially in Europe, since the time of Mesmer. Most of the reports available record the use of the direct symptom removal technic.

That the emotions may affect the endocrine balance has been known for many years. These observations were more or less empiric until Selye demonstrated the relationship between pituitary adrenal activity and mental processes. He showed that mental stress may disturb pituitary adrenal activity and result in disturbances of the endocrine balance. Some types of menstrual abnormality occur in this setting. Disturbances of this type respond to hypnotherapy including excessive menstrual bleeding.

Certain psychogenic allergic reactions respond to hypnotherapy quickly. There are many reports in the literature of various allergies being treated by psychotherapy and psychoanalysis. However, in severe cases of allergy, urticaria and angioneurotic edema, hypnosis may stop the attack and the patient can attain general recovery before the sources of the various conflicts are investigated. Often times where symptom removal is practiced in allergic reactions the allergy will recur at a different site.

While the treatment of urticaria lies within the province of the dermatologist it is not unusual for general practitioners and internists to come in contact with these conditions. The association of urticaria with stressful life situations has been observed by many authors. It is well recognized that the skin may react to normal emotional situations by flushing, pallor, or sweating and that the degree of this reaction depends upon the individual. People can become just as sensitive to an idea or a situation as others are sensitive to pollens. In individuals suffering these reactions hypnotherapy can be invaluable.

Psychogenic aesthenic reactions with general fatigue as a dominant complaint associated with visceral complaints may indicate a physiologic neuroendocrine residue of previous anxiety and not an active psychologic conflict. Man, feeling threatened, may use for long term purposes, devices designed for short term needs. Costly protective activities are essential in life saving. They are devised for fleeting emergencies so that they may destroy those forces that threaten survival but they are not designed to be used as life long patterns and when so utilized they damage structures they are devised to protect. In order to prevent these disorders more knowledge concerning the origin of such patterns in childhood is necessary. However, after such a pattern has been established, hypnotherapy helps to meet the need of a device to break up the pattern.

Post-hypnotic suggestion may be given a patient in whom a childhood conflict has produced the pattern. It is possible to find these patterns and the original emergency situation by means of age regression under hypnosis. Post-hypnotic suggestion is used to help the patient change the pattern after hypnotic investigation has uncovered the original emergency. The patient will find that he need not become exhausted when

things are not going the way he wants. According to Selye[8] any stress or strain causes the organism to react. Physical or mental strain calls into play systemic defenses mediated through the nervous and hormonal systems. Almost all systems of the body may be involved eventually in this process. It is conceivable that the intensity of the syndrome in its development may be lessened if the individual's personality structure is brought to peak of performance and ability to handle efficiently the stresses and strains of life. This implies an attitude of preventive medicine which should be one of the goals of medicine.

Those who have used hypnosis in the treatment of psychogenic aesthenic reaction know how productive it can be. Since results obtained in this field do not lend themselves to easy and simple reporting the frequency of satisfactory results obtained should not be underestimated.

Psychogenic headaches, joint and muscle pains are often seen by the internist. The large group of people who suffer from headaches and general aches and pains with no demonstrable organic cause are placed arbitrarily in this category for greater ease of discussion. The patients with chronic headaches (the majority of which fall into three groups: migrainous, post traumatic and psychogenic), present a problem to the physician. Regardless of the precise mechanism of the production of pain there is abundant clinical experience to prove that all three types of headaches are readily precipitated and made worse by emotional stress and inner conflict. As in the other conditions, neither the psychological nor the physical aspect of the headache can be neglected. Anyone who has had experience with cerebral neoplasms will understand the significance of this statement. There is a correlation between the constant headache and the strong and continued contraction of the scalp and neck muscles. The best results can be expected from the hypnotic approach when it is suggested that the headache itself disappear. Most headaches are associated with anxiety states although they may occur frequently during the menopause and in agitated depressions. The psychiatric condition is usually mild with headache as the outstanding symptom, for all that is needed as a background is chronic muscular tension.

A review of the background and circumstances surrounding the headache often reveals reactions of anger, resentment and hostility, either as a result of environment or as an attitude of personality development. Of almost equal frequency are fears, apprehension and anxiety. The secondary reaction to headache is an important part of such disorders and sometimes the most important part. The sufferer may withdraw from his usual recreations and activities, tend to shun contact with others and because of fatigue avoid physical exercise and try to obtain more rest. Since these measures do not relieve the tension as rest is interfered with by insomnia, the patient may go downhill—the more symptoms, the more anxiety, and the more anxiety, the more symptoms. Chemotherapy does not get at the cause of the disorder. When hypnosis is used to help these patients develop insight much can be accomplished in a single session. However, a patient with symptoms of long standing, with a history and present symptoms of constitutional emotional instability, is a poor subject for insight therapy. Should hypnosis be used in such cases it is advisable to use direct suggestion to remove the symptoms.

Patients with rheumatoid arthritis have been found to express and discharge unconscious emotional tendencies through the voluntary muscles. It is then assumed that muscle spasm and increased muscle tonus may precipitate an arthritic attack. There is psychogenic rheumatism and arthralgias, all of which respond to hypnotherapy and hypnotic symptom removal.

There are several metabolic disturbances in which emotional factors play a part. We are all aware of the treatment of obesity by hypnotic suggestion. The emotional elements in the production of obesity are described by Mirsky[9] who explains that overeating usually is the result of some disturbance in the emotional development of the individual so that the individual reacts to

frustration in the present by withdrawing to a behavior which was gratifying in the past. Food or being fed becomes associated with the pleasurable sensations such as warmth, odors and the soothing aspects of the person who is providing the food. Then eating can come to mean something which is inseparable from the relief of tension, affection and other pleasurable feelings, an association which is never completely abandoned.

Where the infant has been over indulged in respect to food, he may become reluctant to relinquish this phase of development and thereafter he may automatically return to it whenever he encounters a situation which is unpleasant, anxiety producing or frustrating. In such an individual the tension induced by the need for affection, for prestige or by loneliness may be relieved only by withdrawing to that phase where eating was a satisfactory solution. On the other hand, if the infant's earliest tensions were not relieved adequately he may never outgrow his need for food and will persist in his attempts to receive the satiation of which he was deprived. Thereafter such individuals may relieve their anger, envy or frustration by eating. Irrespective of the basic genesis, it appears that overeating is the obese person's habitual response to the necessity for solving such difficulties as are encountered in adult life by everyone. With an understanding of the conflicts involved, the intelligent use of hypnotherapy has assisted many obese patients to reduce without resorting to "health farms," "beauty treatments," fad diets or dangerous over dosage with thyroid medication. For some patients the close personal inter-relationship (transference) involved in hypnotherapy satisfies their emotional needs and as a consequence they find it easy to follow a restricted diet; in others the suggestion of symptoms of anorexia will accomplish the same purpose. In still others, the authoritarian command to restrict both the intake and type of food meets with success.

Emotional glycosuria has been demonstrated in man and experimental animals. Recurrence of diabetes has also been recorded in a setting of emotional conflict and in fluctuations in this disorder have been correlated with the emotional state in some patients. This author treated by a general psychotherapeutic method, a 15-year-old boy whose diabetes could be completely controlled by simple dietary management after his psychotherapy. Previous to this he had severe diabetic states which were based on a stressful life situation which aroused emotions of fear and rage. In selected cases the use of hypnotherapy can reduce the quantity of insulin needed to keep the urine sugar-free and hypnotherapy can be used to induce an easier acceptance of the restricted dietary regime.

Studies of hypoglycemic fatigue have showed that some of these patients suffer from apathy, loss of zest and a general let down feeling; that fatigue is present on awakening, becomes more severe by mid-morning, improves after lunch and is most marked by mid-afternoon. Hyper insulinism must be considered a possible mechanism, but it may, on the basis of prolonged stimulation of the right vagus nerve, result from emotional processes relayed through the hypothalamus to the nervous system. To give these patients more permanent relief psychotherapy is often necessary. Combining therapy with atropine sulphate and a low sugar diet plus hypnotherapy has met with gratifying results. Internists and general practitioners are often called upon to treat conditions which in the strictest sense belong to other specialties, particularly psychiatry, such complaints as insomnia, reactive depression, hiccups, stammering, nail biting, hair pulling, tics, intractable psychogenic pain, hysterical aphonia, alcoholism, etc. For those who are able to use hypnosis and hypnotherapy much can be done for these conditions.

I would like to present a brief evaluation of the use of hypnosis in surgical conditions. Hypnosis has been used as an anesthesia, but this is a prolonged procedure and belongs in the hands of a skilled anaesthetist. However, in the differential diagnosis of a surgical condition and in the evaluation of the amount of psychogenic material that is

aggravating or producing the surgical condition, hypnosis can be invaluable. Bennet & Engle[10] reported a group of 121 women and 14 men who together had 244 operations including operations on the kidney, thyroid, gall bladder, etc., which were designed to bring relief from symptoms due to "nervousness." Bennet[10] studied a hundred patients on whom 179 operations had been performed, at least one half unnecessarily. For example, patients with acute abdominal pain even in the absence of demonstrable organic pathology are frequently regarded as candidates for laparotomy. It is often forgotten that pain can either be organically determined or psychogenically based. It may be both, and emotional and organic components may be present to varying degrees. Laparotomies are probably the most frequent of all of the operations that are done. However, specific syndromes can lead to operation without relief to the patient, for example, in individuals with trigeminal neuralgia, individuals with apparent Menieres' disease, breast amputations, low back pain for which a disc operation is done and various other syndromes.

There is of course the patient who comes to surgery where emotional factors contraindicate elective surgery. Surgery may fit in with the patient's unconscious fantasies and fears and a psychotic state may crystallize post-operatively. In patients demanding breast amputations or hysterectomies a personality evaluation may be worthwhile. If nothing can be discovered and the patient is not a risk in relation to hypnosis, hypnotic investigation may reveal definite emotional problems which contraindicate the surgery. This author has seen one patient who insisted upon a tonsillotomy for a soreness and fullness in his throat who developed a schizophrenic reaction following this relatively uncomplicated surgical procedure.

There are emotional conditions which may seriously interfere with a smooth post-operative convalescence because patients often suffer from two or more co-existing pathological conditions. If individuals are emotionally disturbed hypnotherapy can often be of value when they need to undergo surgery to make it possible for a smoother post-operative course. In these circumstances the precipitation of a psychoses, the precipitation of a limited delirious reaction, or the precipitation of a hysterical conversion symptom may all come out of the surgery, although the surgery itself is certainly not contraindicated. Psychiatric consultations should be considered for patients on whom hysterectomies have been recommended, on patients with a typical facial or other neuralgia and on all patients who had multiple surgery, as well as those patients who present emotional reactions during the surgical consultation.

The use of hypnotherapy in dermatology is often extremely valuable in view of the fact that common skin reactions are functionally related to common psychological reactions of fear and embarrassment. This author saw a young woman who came to the clinic after having been arrested for intoxication. She was a minor. On arrival at the clinic she showed a severe pustular reaction of the skin which could best be described as looking like a mild case of smallpox. A thorough psychiatric evaluation was done and in this somewhat hysterical girl, superficial reassurance by this author and a female senior medical student who was very maternal was given. Two days later when the patient returned to the clinic her skin was clear. The type of response in this patient was due to "waking suggestion." In dermatological cases two things may be done, both effective in removing the dermatological lesion. The patient may be hypnotized and told in a positive, confident manner that the skin symptoms will immediately start to heal or disappear. During the same session or in following sessions an investigation of causal factors can be undertaken and advisory psychotherapy may be carried out. Here a direct suggestion of the disappearance of attitudes which underlie the symptoms is given. This may then later be discussed with the patient at a waking level. Both of these methods result in recovery from the skin condition.

A great deal of work has been done utilizing hypnosis in obstetrics. Suggestive meth-

ods for producing relaxation in order to reduce the individual's sensitivity to pain have been employed since ancient times, from the Temple Sleep of the ancient Egyptians and Hindoo medical practices through the work of Janet and others,[12] the value of relaxation in mitigation of pain has been recognized. Jacobson has incorporated the physiological principles which have led to the present day relaxing technics. Utilizing all of these concepts Grantly Dick Read[13] has postulated a fear tension pain syndrome. The value of his work relies upon the use of education, relaxation and suggestion. Some obstetricians believe that Read's methods are based on a type of hypnoses, particularly, the light trance (waking hypnotism). This is denied by Read,[14] even though he describes a trance like state during the second stage of labor. However, when one raises the pain threshold in an individual this does not follow a Smith, or a Jones or a Read method, but follows definite laws of suggestion.

Many obstetricians believe that hypnosis, even the light trance (waking hypnosis) or the deep trance (somnambulism) affords an excellent opportunity for painless labor. J. B. DeLee[15] of Chicago Lying in Hospital has stated that the only anesthetic that is without danger is hyptoism. Psychiatrists claim no person ever died under pure hypnosis. DeLee says, "I have used suggestion a great deal, indeed almost constantly, and I am irked when I see how my colleagues neglect to avail themselves of this harmless and potent remedy." Kroger & DeLee[16] have demonstrated over and over again that hypnosis has unrealized possibilities for making childbirth not the equivalent of a surgical operation but rather a satisfying psychological experience.

There are many advantages and indications for the use of hypnosis in labor, some of which I enumerate:

1) Hypnosis is not a complicated procedure, any physician can learn this method. 2) No apparatus or expense is involved. 3) There is no respiratory or circulatory depression in the mother or fetus with resulting anoxia, asphyxia or cerebral damage. 4) Hypnosis raises the resistance to obstetric shock, circulatory and respiratory failure. 5) Resistance to fatigue and muscular effort is raised during hypnosis. Thus there is little or no maternal exhaustion. 6) Hypnosis is indicated when dealing with patients having a toxemia of pregnancy or cardiac decompensation or with a premature baby. 7) With deep hypnosis (somnambulism) there is complete dissociation instead of hyper-excitability. The patients are calm, quiet and relaxed. 8) There is no depressant action on uterine contraction and retraction as seen with most general anesthetics. 9) There are no profound emotional reactions, manifested by delirium. 10) Hypnotic analgesia and anathesia is easily controlled. 11) Post-operative recovery is smooth, there is no danger of pneumonia, etc. 12) Blood loss is decreased during the hypnotic state probably due to a vasopastic condition of the capillaries or an effect on the blood coagulation time. 13) No injections are needed as with continuous caudal, spinal, or saddle block. 14) The subjective pain element is not lost—the patient can be "awakened" at any time, allowed to feel the contractions and see the birth of her child. 15) The undivided attention of the physician is not required if trained personnel are available. 16) Control can be transferred to an intern, anaesthetist, or even the husband. Both analgesia and anathesia can be produced over the telephone. 17) There is no increase in the instances of operative delivery. 18) Complete relaxation or contraction of the abdominal wall and perineum can be produced simply by command of the therapist. 19) There is not the remotest possibility of danger to mother or baby, 20) No relaxation or breathing exercises are needed. The physical value of such training is not yet clear.

There are some disadvantages to hypnosis and these I will detail now:

1) Hypnosis has been associated with vaudeville and charlatanism and since many physicians must practice medicine according to the dictates of public policy they may hesitate to use the method. 2) Due to erroneous misconceptions the lay person feels that there is a stigma attached to being hypnotized. This may make the patient difficult to become hypnotized. 3) Time and effort on the part of the physician is required. This is particularly true for obstetricians who must give a certain amount of prenatal hypnotic training and if trained hospital personnel are not available he must be present with the patient during the entire labor. 4) All people are not susceptible to hypnosis. This is an individual problem and varies with the patient and even changes in the same patient under different circumstances. 5) For the general physician, simple hypnosis and removal or supression of a symptom by direct hypnotic suggestion without giving the patient something positive in their stead can be potentially dangerous. Therefore each physician who desires to use hypnosis must acquaint himself with the ability to recognize a masked depression or a severely weakened ego, as hypnosis may bring to the fore a depression of suicidal pro-

portions or may produce a psychotic shattering of the ego. Thus the physician who uses hypnosis must take care that he does not injure the patient or introduce a more severe problem. All of us are used to aseptic technics and we can develop a kind of psychological asepsis so that we do not create further difficulties for the patient.

Case Demonstration

The utilization of hypnosis in psychiatry can be complicated since many things may be done under hypnosis that cannot otherwise be done. In demonstrating its use on this patient a specific technic is being used, known as hypnotic "ablation." The subject is hypnotized through visual fixation and the depth of the hypnotic state is tested with sensory and motor suggestion. The patient is told that she will not remember anything that goes on in the hypnotic session and she will be disoriented from present time-space and gradual regression to specified age levels will be suggested. At a specific age level she is "awakened" and questioned in relation to her knowledge that her age indicates. Since it is a somewhat painful situation to be regressed to earlier age levels I do not ask the patient to remain at the younger age level for any length of time. However, there is opportunity for questions. The reason why the hypnotic regression is traumatic to the patient is because it takes her back to those years when her life was full of pain and frustration. I am going to ask her about some of the problems that disturb her at the specific age periods. It is interesting that this material originally was not available in the waking state in analysis. It was uncovered by age regression technics and the patient then became familiar with it by suggesting to her that she recall what she had discussed under hypnosis at the regressed age level. This patient suffered from many psychosomatic conditions, among them severe dysmenorrhea with severe post-menstrual bleeding. She also suffered from chronic constipation, frequent sore throats, colds, sinus trouble, headaches, nausea, occasionally vomiting, extreme weight loss to 76 pounds, episodes of extreme fatigue, aching of all the joints and weakness of the arms and legs. There were also secondary symptoms, such as anemia, following each episode of severe bleeding. All of these symptoms are now under control and the majority of them have been resolved.

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Clinical Trial of RO 5-0690 and Chlorpromazine on Disturbed Chronic Schizophrenic Patients

T. E. WECKOWICZ, M.D., and T. WARD, M.D.

Ro 5-0690, produced by Hoffmann-La Roche is 7-chloro-2-methylamino-5-phenyl-3H-1, 4-benzodiazepine 4-oxide hydrochloride or structurally:

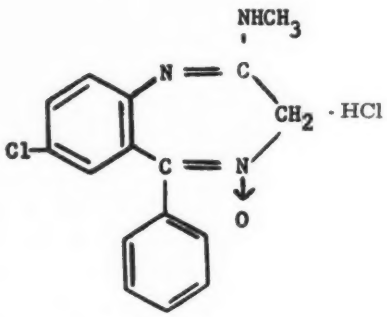

Figure 1.

On the basis of laboratory studies it was described as having tranquilizing and muscle relaxant properties, similar to those of meprobamate, but with relatively weak hypnotic action in animals.[2]

This study is a pilot study in which the tranquilizing effect of Ro 5-0690 was compared with that of chlorpromazine. Double-blind technique was used. The sample consisted of 48 disturbed female chronic schizophrenic patients from two chronic wards of a mental hospital. The patients were overactive and violent; some of them were poor eaters. The patients were rated on the Weyburn Assessment Scale.[1]

On the basis of rating they were divided into three matched groups, 16 female patients in each group.

Group A: Mean Weyburn Assessment Scale score was 51.06 (range 30-87), the mean age was 48 years (range 29-69). The mean duration of the stay in the hospital was 16 years (range 2-31). There were seven hebephrenic, five paranoid, three catatonic and one simple schizophrenic in this group.

Group B: Mean Weyburn Assessment Scale score was 51.06 (range 32-83). The mean age was 48 years (range 27-71). The mean duration of the stay in the hospital was 13 years (range 2-29). There were seven hebephrenic, seven paranoid and two schizophrenics with mental deficiency in this group.

Group C: Mean Weyburn Assessment Scale was 51.06 (range 32-81). The mean age was 49 (range 29-62). The mean duration of the stay in the hospital was 15 years (range 1-32). There were six hebephrenic, six paranoid, two catatonic, two undifferentiated schizophrenics in this group. The subjects were weighed and they had a white blood cell count before the commencement of the drug trial.

Group "A" was put on chlorpromazine, group "B" on placebo and group "C" on Ro 5-0690. The patients in the three groups received respectively from bottles marked "A," "B" and "C," 50 mg. tablets which looked exactly the same. The trial lasted eight weeks. The dosage in the three groups was increased gradually (1 tablet a day for two days, two tablets a day for three days and three tablets a day for the remaining 28 days).

The subjects were assessed by the same rater on the Weyburn Assessment Scale at the end of two weeks and again at the end of four weeks. At the end of the study the patients were weighed and the w.b.c. count was done again.

Results

In assessing the results the scores on the Weyburn Assessment Scale and the reports of the nursing staff were taken into consideration.

The scores on the Weyburn Assessment Scale are summarized in Table I.

From University Hospital, Saskatoon, Sask., Can.

TABLE I

Mean Score	1st	2nd	3rd
GROUP A			
Chlorpromazine	50.6	49.8	47.7
GROUP B			
(Placebo)	52.3	49.1	48.9
GROUP C			
(Ro 5-0690)	51.6	51.7	48.4

It can be seen from Table I that the scores in all three groups tend to be slightly lower on the third assessment but there is not much difference among the groups.

The nursing staff reports were classified into three categories: "No change," "Worse," "Better." The results are summarized in Table II.

TABLE II

Result	Chlorprom-azine	Ro 5-0690	Placebo	Total
"No Change"	6	1	8	15
"Worse"	5	6	5	16
"Better"	3	8	2	13
	14*	15	15	44

*The number is less than 16 in the groups, because some patients refused to take the tablets.

It can be seen from Table II that the number of improvements is highest in the Ro 5-0690 group. However, the chi-square of this distribution is $x^2 = 6.828$, which with four degrees of freedom is not significant. The improvement was described in the following terms: the patients became quieter, more co-operative and less resistive; three patients on the drug became aggressive.

Ro 5-0690 produced many unpleasant side effects, the worst of which was ataxia with muscular incoordination, staggering gait and slurred speech. These occurred in four cases. One patient had a fainting spell during which she fell and broke a hip. (The treatment had to be discontinued.) In five cases there was a marked drowsiness, in one, anorexia and in one case, weakness. Chlorpromazine produced drowsiness in two cases. Neither Ro 5-0690 nor chlorpromazine produced any change in weight or white cell blood count.

The results of the study are largely negative. Both Ro 5-0690 and chlorpromazine in the doses given, failed to produce significant improvement. Ro 5-0690 produced many side effects in these chronic patients.

Summary

During a study it was found that both Ro 5-0690 and chlorpromazine failed to produce improvement in deteriorated schizophrenic patients. Ro 5-0690 produced many unpleasant side effects in these chronic schizophrenic patients.

It was found that Ro 5-0690 tended to activate chronic schizophrenic patients although it did not produce marked clinical improvement.

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Psychiatric and Psychological Aspects of Myxedema

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It is of interest that despite many review articles on thyroid conditions,[1,2] there is a minimum of discussion of mental symptoms beyond the frequently mentioned "impairment or slowing of cerebral functioning." This article is an attempt to point up some of the accompanying psychiatric and psychologic aspects that are present in myxedema with a case report of myxedematous psychosis.

The frequency of mental symptoms in this disease is difficult to estimate as with earlier diagnosis and treatment the emotional disturbances may not become manifest. It should be noted that the Committee on Myxedema of the Clinical Society of London in 1888 observed nearly half the cases of myxedema with hallucinations or delusions which could be an approximation of psychosis occurring in the natural history of the disease.[3] Lerman reported more than two-thirds of 77 patients to have lethargy, slow speech and impaired recall in his series of cases.[4] Another limiting factor in obtaining a statistical incidence is in defining what mental symptoms are present and to what degree. Thus it may often be that a mild depression accompanies a case of myxedema which clears with appropriate therapy and is overlooked by the clinician or considered with the "lethargy" often noted. Similarly an impairment in higher intellectual capacities may be overlooked by ascribing it to a lack of initiative. Mental changes may also be glossed over as due to "menopausal symptoms" due to the high incidence of hypothyroidism in this age group. The difference in types of clientele with signs of hypothyroidism seen by general practitioners and internists as contrasted with those seen by psychiatrists is also a problem in attempting to get an accurate overall picture of frequency.

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Report of a Case

A 39-year-old white, married female was referred to the University of Minnesota Hospitals by a private physician who had seen her only once on the day before admission; he noted agitation and paranoid behavior. The patient had not been seen by any physician for several years previous. On admission, a four to five year history of emotional instability with temper outbursts was given with at least a two year history of cold intolerance, dry skin and hair, coarse voice, facial puffiness, occasional ankle swelling, chronic fatigue, sleeping 12 hours per night, constipation, dyspnea on exertion, skin color becoming progressively more yellow, dizziness and frontal headaches accompanying her fatigue along with some nausea and vomiting. Menstrual periods had been irregular over a ten year period prior to admission and for the year before admission the patient had been flowing every two weeks for seven days using ten pads per day.

On admission to the medical service the patient was noted to be a large, well-developed female, 5′ 11″ in height and 165 pounds (compared to 182 pounds 3 years prior to admission). Vital signs were a blood pressure of 115/82, pulse of 82 and respirations of 18. Her skin had a diffusely yellowish tint with periorbital edema and facial puffiness; a brownish area of pigmentation was present on her forehead which she frequently rubbed. The left border of cardiac dullness was at the midclavicular line with no murmurs detected. Chest examination was negative. The liver edge was palpable 10 cm. below the right costal margin and had a firm, sharp edge. She was observed to pass flatus frequently and eructate a great deal. The classical myotonic reflex change was present on neurologic examination. During the first two days of her admission she became more overtly agitated and was consequently transferred to the psychiatry service.

At the time of her transfer besides the above mentioned symptoms and signs the patient was noted to have a disheveled appearance and to be in a state of great anguish. She repeatedly rubbed her forehead and stated it was a way of communicating with her relatives. Stereotypy of speech and manner were present. Her speech was repetitive with much blocking. Auditory, visual, olfactory and gustatory hallucinations were pres-

ent. She frequently heard voices of relatives and was observed to answer them back. White, blood-stained crosses with inner-tubing wrapped around them and flowers "for the dead" were hallucinated. She reported smelling decay and filth and tasted manure. Ideas of reference and feelings of influence were also present. Her affect was very labile fluctuating from tears to a hostile, resentful attitude. Despite her perplexed state she was oriented to time, place and person with fair remote memory but which became more impaired for recent events. She showed a short-attention span with difficulty in concentration. Arithmetic was performed slowly but usually accurately. Her abstract thinking was impaired and showed many inappropriate responses with a personalistic interpretation along the lines of hallucinatory material. Judgment was erratic and impulsive. Laboratory work revealed a white count of 9,500 with a normal differential, a hemoglobin of 9.9 gms. % and an ESR of 65 millimeters. Cell indices were: MCD of 8.7 microns, MCV of 100 cu. microns, MCH of 29 micro-micrograms, and MCHC of 29%. Urinalysis was normal. Serum bilirubin was 0.1 and 0.4 mgs. % for the one minute and total. Cholesterol was 257 mgs. %, BSP 5% retention, glucose 137 mgs. % postcibum, albumin-globulin of 3.7 and 3.1 gms. %, and alkaline phosphatase of 8.1 K.A. units %. Serology was negative. Her PBI was 0.7 micrograms %, BMR-33% (with the patient in her agitated state) and an EKG showed diffuse low voltage and T wave changes. An EEG was normal. Chest x-ray showed marked, generalized cardiac enlargement. Radioactive iodine 131 uptake at 24 hours was 4% and 2.7%.

The patient was started on dessicated thyroid, ½ grain and gradually built up to 3 grains, per day. During the course of her hospitalization her agitation gradually subsided along with her hallucinations. The olfactory hallucinations and paranoid ideation were the last to subside approximately six weeks following the initiation of therapy which is longer than the frequently given textbook period of 10-14 days for the disappearance of mental symptoms. She was also treated with Trilafon, 8 mgs. q.i.d. during the acute psychotic stage of her illness. These changes accompanied an overall improvement in the patient's physical appearance. A repeat PBI

TABLE I

PSYCHOLOGICAL TEST	PRE-TREATMENT		INTERIM (1 WEEK)		POST-TREATMENT (6 WEEKS)	
	Score	*Percentile*[1]	*Score*	*Percentile*	*Score*	*Percentile*
Wechsler Adult Intelligence Scale	Verbal I.Q. — 82 Performance I.Q.—65 Full-scale I.Q. — 73	10 1 4				
Wechsler-Bellevue Form II (I.Q. = Intelligence Quotient)					Verbal I.Q. —103 Performance I.Q.— 82 Full-scale I.Q. — 93	55 10 30
Binet Vocabulary			Estimated I.Q.—98	50		
Porteus	Failed lowest level*	1	T.Q.—36*	1		
Porteus Extension Series (T.Q. = Test Quotient)					T.Q. — 43*	1
Partington Pathways	Below lowest norms*	1			Below lowest norms*	1
Graham-Kendall	Corrected 9.5*		Unchanged*		Corrected 8.5*	
Wechsler Memory Scale I	Corrected M.Q. — 61.5	1				
Wechsler Memory Scale II (M.Q. = Memory Quotient)					Corrected M.Q. — 78	7

1. %: Approximate percentile in the general population. In the interpretation of percentile there is an inequity of units, especially at the extremes. Thus, the raw score differences between the 0 and 10th percentile are seven times as large as that between the 40th and 50th.
*: Call brain damaged by the norms.

one month following admission was 3.6 micrograms %. Two months following admission there was a definite decrease in the heart shadow, and at that time her cholesterol had dropped to 149 mgs. %. A repeat BMR in a resting state was —32% at that time which was believed an accurate record compared to the initial value in her agitated condition. Her anemia failed to respond to thyroid medication and repeat indices showed indices of MCV, 83.5 cu. microns, MCH, 25 micro-micrograms, and MCHC, 30%. A serum iron after 6 weeks of thyroid therapy was 28 micrograms %, and the patient was started on a course of intramuscular iron therapy from which she has had a slow response with her hemoglobin being 11.0 gms. % at the time of discharge. To rule out any gastrointestinal pathology that could be associated with her poorly responding iron deficiency anemia a GI series, Ba enema and proctoscopic examination were done and all were reported as negative. Pelvic examination revealed no current pathology.

Table I indicates the changes occurring and the remaining deficits in the various psychological tests used for evaluation prior to treatment, following one week of therapy, and after six weeks of therapy when her psychotic manifestations had cleared. The patient was functioning at a general intellectual level comparable to mental deficiency prior to treatment. Her Verbal I.Q. was approximately normal within one week after the administration of the hormone, and showed a further slight increment of improvement in the succeeding five weeks. Her original performance I.Q. was less responsive, and, though improved, remained deficient (approximately dull normal level) at the end of the six weeks. Negligible changes in the other areas assessed imply chronic marked deficit. Severe inadequacies in the ability to apprehend tasks and to carry through a planned mode of activity to accomplish the specified outcome were demonstrated throughout the six weeks of testing. Continuing memory failures were especially evident in her inability to retain imagery necessary for auditory-vocal and visual-graphic performance and in her inability to acquire new material, especially if meaningful. Finally, visual-motor coordination remained, throughout, her most serious deficit.

Comment

Mental changes caused by or associated with impairment of brain tissue function may be first divided into the *acute* and *chronic* varieties distinguished by the reversibility of the brain pathology present and not related to the etiology, onset or duration of the condition. In some cases the biochemical lesion producing the acute brain syndrome may progress to an irreversible morphological lesion. In both the acute and chronic reactions two subsets of mental changes may be found:

(1) *Primary signs of organic mental dysfunction* which includes impaired orientation and memory, impairment of all intellectual functions (comprehension, calculation, knowledge, learning, etc.), impaired judgment and lability and shallowness of affect.

(2) *Secondary functional signs* which may include psychotic (e.g. depressed or paranoid), neurotic or behavioral disturbance. These symptoms are due to release of hitherto latent personality characteristics, current conflicts, environmental stresses and interpersonal difficulties. Such changes are viewed as being released by the organic brain condition or superimposed on it.[5]

The primary organic changes accompanying hypothyroidism in category one are those often referred to in the literature as "impaired cerebral functioning." These take the form of difficulty in apprehending, indecisiveness, preoccupation and poor concentration, impaired memory and slowing of one's reaction time. General intellectual (especially verbal) ability seemed only acutely disrupted in the patient discussed here. Chronic deficit, or at most the possibility of asymptomatic improvement, seemed apparent in the areas of apperception, planning, purposive thought or action, and visual and verbal retention, especially as these relate to meaningful material. Apparently there has been severe permanent residual brain damage in this case, and though the patient is within the normal range in general intelligence, the meaningful application of it is very likely to be poorly conceived and executed. Category two can run the gamut of symptoms seen in the various clinical psychiatric disorders and is not necessarily parallel in severity to the degree of brain damage present. Symptoms of depression are seen frequently in myxedema, or those of a more agitated type with extreme irri-

tability and agitation, labile affect, hypomanic behavior, and paranoid ideation with hallucinations and delusions.

Summary

A case of myxedematous psychosis is reported in which a relatively slow disappearance of the secondary functional signs of mental illness occurred on thyroid medication. Psychological testing indicates some residual, chronic signs of brain damage presumably due to the long-standing metabolic disorder this patient had, and the possibility of such chronic changes occurring in hypothyroid patients which are not usually detected.

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